STAFF PERCEPTIONS OF THE PHYSICAL ENVIRONMENT OF THE PEDIATRIC HEMATOLOGY AND ONCOLOGY UNIT AT MONTEFIORE, THE UNIVERSITY HOSPITAL FOR ALBERT EINSTEIN COLLEGE OF MEDICINE

A Thesis

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by

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ABSTRACT

Introduction: Healthcare environments are unique in that they serve as both spaces to treat patients and workplace environments for hospital staff. There is a growing body of research studying the effects of hospitals' physical environmental features on the patient experience, such as lighting, noise, and color. However, less is known about how the physical environment impacts hospital *staff,* how they perceive the physical features of these environments, and how such perceptions may impact staff outcomes such as workplace satisfaction and performance.

Aims: This study sought to evaluate how hospital staff of the pediatric oncology unit at Montefiore perceive their physical working environment, and how these perceptions shape their workplace experience, satisfaction, and performance.

Methods: Data were collected through an online survey ($N = 35$), focus groups with hospital staff members ($N = 12$), and interviews with architects of the facility redesign ($N = 3$).

Results: Statistical analysis of the online survey results revealed that staff perceive twelve physical environmental features to be significantly more important than they are currently effective in the facility. Furthermore, results of focus group and interview measures revealed greater insight to how the current space compromises various components and responsibilities integral to the workplace, including staff and patient flow, privacy, lighting, and noise.

Conclusion: Staff experience is highly influenced by design of the physical environment. It is important to provide staff with a well-designed workplace environment that supports their needs and allows them to carry out their job to the best of their ability.

BIOGRAPHICAL SKETCH

Samara Petigrow was born in Mount Kisco, New York and was raised in Goldens Bridge, New York. She received her primary education in the Katonah-Lewisboro School District in Northern Westchester County, and graduated from John Jay High School in 2012. In the fall of 2012, Miss Petigrow enrolled in Cornell University's Department of Design & Environmental Analysis (DEA), immediately drawn to the program's intersection of art, behavioral science, and analytic thinking.

For her four years as an undergraduate student at Cornell University, Miss Petigrow studied DEA with a concentration in interior design. During her time as an undergraduate, she served as a Studio Lead for Cornell's chapter of Design for America and as a student designer for the College of Human Ecology's Office of Facilities and Operations. She also served as the Chairperson for College of Human Ecology Ambassadors. In the spring of 2015, Miss Petigrow studied interior architecture at the Danish Institute for Study Abroad in Copenhagen, Denmark. During her summer breaks as an undergraduate student, she interned for the College of Human Ecology Office of Facilities, and HDR, Inc. in Manhattan, New York, NY. In May of 2016, she graduated with a Bachelor of Science.

After completing her undergraduate education at Cornell University in Design & Environmental Analysis in 2016, she continued for an additional year in the department to pursue a Master of Arts degree as a "4 + 1" student. This is Miss Petigrow's first research project.

Following her graduation from graduate school, Miss Petigrow plans to work at Design Republic, an architectural design firm in New York, NY, where she will work in strategic planning and design for workplace, retail, and media/entertainment clients.

Dedicated to my grandmother Susan Breslow Dillon, Cornell University ’57, whose passion for education as well as this university has been a constant inspiration to me throughout my five years as a Cornell student. And to hospital staff everywhere, whose tireless work often goes unnoticed. I hope my research can help bring to light how important it is to make your work experience as positive and well designed as possible.

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CHAPTER ONE: INTRODUCTION

1.1 Background to Pediatric Cancer and Infusion

The specialty of pediatric oncology surfaced in the United States' medical field in the late 1940s following the Second World War. Since its emergence, children have received greater, more specialized care from trained surgeons, radiologists, and therapeutic professionals instead of general physicians without specific knowledge of the field. Seminal studies by Sidney Farber, who worked as a pediatric pathologist at Boston Children's Hospital, paved the way for the evidence of successful chemotherapy infusion in remission of leukemia. Subsequently, chemotherapy and infusion soon became popular practices in treating children with cancer (Wdlff, 1991).

Since its genesis in the late 1940s, research on pediatric cancer and subsequent treatment procedures have advanced tremendously. Though the incidence of cancer amongst children has been rising marginally, survival rates have increased significantly over the past several decades. According to the American Cancer Society, over 80% of today's pediatric cancer patients will survive five or more years – a large increase from the 58% five-year survival rate in the 1970s. Still, cancer remains the second leading cause of death for children ages 1 to 14 years; approximately 1,250 children under 15 years old were expected to die from cancer in 2016. Leukemia remains the most common type of cancer amongst children, accounting for 30% of all child cancers (American Cancer Society, 2016).

Pediatric oncology treatment facilities serve as a vital source of cancer care for children across the country and the globe. Over 200 leading children's hospitals for cancer care form the Children's Oncology Group (COG) coalition, which serves over 90% of children and adolescents

with cancer in the United States. These cancer treatment centers are responsible for providing patients with the best possible care and services, including chemotherapy, infusion, radiation, and surgery (Children's Oncology Group, 2017). Treatment centers often consist of other specialty services to aid in the treatment of cancer, such as psychologists, nutritionists, teachers, and social workers (American Cancer Society, 2016). The comprehensive provision of these services is made possible by treatment facilities; as such, it is crucial that the facilities are planned and operated at the highest quality to promote treatment and service excellence.

1.2 The Children's Hospital at Montefiore

Of the hundreds of pediatric oncology facilities across the United States, the site of interest for this research study is the Jerome L. Greene Day Hospital for Pediatric Hematology-Oncology at the Children's Hospital at Montefiore (CHAM). Montefiore Health System is an integrated academic health care delivery system comprised of eight hospitals across the greater New York area, including the Moses campus in the Bronx, NY, where CHAM resides. Opened in 2001, CHAM houses a total of 132 beds and employs 552 associates (Montefiore, 2015). The outpatient pediatric hematology-oncology facility is currently undergoing a redesign and relocation within CHAM, placing it in an ideal position to assess the current facility performance against which the new design can be compared.

1.3 Significance: What We Know

In recent years, an extensive amount of research has been conducted studying the effects of hospitals' physical environmental features on improving the patient experience, such as lighting (Choi, Beltran, & Kim, 2012; Joarder & Price, 2013), noise (Hilton, 1985; Snyder-

Halpern, 1985), and artwork (Lankston, Cusack, Fremantle, & Isles, 2010; Ulrich, Lundén, & Eltinge, 1993). However, only a small fraction of this research focuses on the effects of these features specifically within pediatric oncology facilities. Moreover, there is a large gap in existing research on how *staff* perceive the physical features of these hospital environments, and how such perceptions may impact staff outcomes such as workplace satisfaction and performance. Hospitals and healthcare settings are unique in that they not only serve as spaces to treat patients, but also as workplace environments for clinical and non-clinical staff. In past research studying the effects of the physical environment on healthcare outcomes, patients' healing experience and general wellbeing have been placed as the central focal points; rightly so, as healthcare facilities exist first and foremost to serve, treat, and improve patient health. However, it is important for research to place a greater emphasis on studying outcomes for medical staff that work on-site, as the physical environment conditions are perhaps equally influential on their satisfaction and performance as they are on patient experience. The balance between satisfying staff needs and patient needs presents a constant conflict in both hospital design and operations (Farrell, Joseph, & Schwartz-Barcott, 2005), but the more effectively a facility can meet both staff and patient needs, the more successful it will be in promoting positive outcomes for all stakeholders involved.

CHAPTER TWO: LITERATURE REVIEW

There is a growing body of research that connects conditions of the physical workplace environment to staff outcomes in the healthcare realm. Based on the obvious shortcomings of the current outpatient pediatric oncology facility at CHAM, including crowding, noise, poor lighting and limited privacy, a literature review was conducted to better understand what is known about the influence of these issues on staff experience and outcomes in healthcare environments. The literature review concludes with a summary of publications that address how post-occupancy evaluations, surveys, and focus groups contribute to the developing body of evidence-based design for creating high quality pediatric oncology facilities.

2.1 Crowding

Several studies have supported the link between crowding in healthcare facilities, hospitals especially, and compromised workflow, patient flow, decision-making processes, and ethics amongst hospital staff. Many hospitals and healthcare facilities experience high-volume crowding due to an increasing demand for healthcare and decreasing or stagnant supply of providers, resources, and physical space in the facilities themselves (Bernstein et al., 2009). Crowded waiting rooms and high volumes of patients whom require health facilities can have tremendous repercussions for health outcomes of patients and staff, as well as for processes that are fundamental to healthcare service, such as admitting, treating, and discharging patients (McCarthy et al., 2011; Michelson et al., 2012; Rowe, 2006).

This research requires an operational definition of "crowding" within the context of existing literature and when referring to the crowded conditions characterizing Montefiore's

campus. For the purposes of this paper, crowding refers to when the need for health services and facilities exceeds the resources available, and results in decreased quality of care (Asplin et al., 2003). This notion is driven mainly by spatial volume – when there is too large a quantity of people relative to a given space (Moskop et al., 2009). The conceptual model of emergency department crowding is categorized into three levels: input, throughput, and output (Asplin, 2003), and provides context for crowding in other types of healthcare facilities such as infusion suites. The throughput level is of particular concern for this study, as it involves all aspects of the healthcare experience for which staff are held accountable once a patient arrives at the facility; mainly the waiting, admitting, boarding, and diagnostic evaluation processes. Crowding can compromise these practices in a variety of ways, which in turn lead to negative impacts for patient health and wellbeing. These include prematurely discharging patients, increased patient illnesses and frequency of medical errors, as well as compromised medical ethics, privacy, and resource distribution.

A primary responsibility of medical staff is the decision-making process in which nurses, doctors, and other staff members choose how and when to admit patients appropriately. When hospitals are crowded, the likelihood of patients' admission decreases because medical administration is more likely to be unsure of where to place patients seeking care, resulting in turning away patients (Michelson et al., 2012). Additionally, when health care providers are aware of high crowding levels, they may be more likely to discharge patients earlier than appropriate in hopes to free up space and maintain patient flow.

With increased waiting time due to crowding, the delivery of services is delayed, leaving more time for a patient's ailment to worsen (Hing & Bhuiya, 2012; Hwang et al., 2008). Studies have found that crowding increases perception of pain amongst patients (Pines & Hollander,

2008); pain is often further aggravated when coupled with stress and anxiety, which often result from impatience during the waiting process (Rowe, 2006).

When staff are hurried or under pressure to evaluate and treat a higher number of patients than is feasible, the risk of medical error is heightened. Crowded conditions in hospitals often cause excessive cognitive load for nurses and doctors, which results in flawed decision-making processes and errors of treatment (Croskerry & Sinclair, 2001). An observational study by Kulstad, *et al.* (2010) identified a total of 283 medication errors in a given hospital's record with crowded emergency department conditions; errors included incorrect medication dosage, frequencies, durations, and prescription routes. The study revealed that there is a significant association between crowding and frequency of medical error. Clearly, the performance of medical professionals deteriorates due to the effects of crowding on cognitive processes and error frequency.

Evidently, crowding in healthcare facilities results in poor decision-making processes, increased medical errors amongst medical staff, and increased perception of pain amongst patients. These all point to the influence crowding exerts on the ability for healthcare professionals to uphold medical ethics (Moskop, 2009). There are four primary tenets providers are expected to uphold: non-maleficence, beneficence, justice, and respect for autonomy (Moskop, 2009). Moskop argues that crowding in healthcare facilities may compromise or violate several, if not all four, of these tenets. When a facility is crowded, it compromises the ability for providers to effectively carry out their responsibilities and provide need services in a timely, organized manner. As a result, medical administration is forced to shift their practices to handle crowding, and moral principles may be compromised in an effort to maintain structure and workflow. For example, beneficence emphasizes the promotion of positive outcomes. These

positive outcomes in hospitals are most commonly associated with prompt and active treatment of patient conditions. When this treatment is delayed due to crowded conditions (Chalfin et al., 2007; Michelson et al., 2012), patients experience prolonged pain, and increased stress and anxiety (Hwang et al., 2008), none of which can be considered beneficial to the patient.

Additionally, crowding in health facilities often imposes on the physical and emotional privacy of the patient, as well as the confidentiality of their medical conditions. Crowded facilities often force medical staff to treat patients in spaces where there is little physical space between each patient or multiple patients per room; this compromises the patients' ability to feel that their medical condition is confidential, as well as their desire to openly communicate about their medical conditions with their nurse or physician (Moskop, 2009). As a result, patients often feel embarrassment, violation, and resentment towards their physicians (Moskop, 2009).

Lastly, a moral consequence of crowding is the fairness of how medical resources are distributed. As stated earlier, health facility crowding is primarily a result of increased demand for health services and decreased supply of resources. With conditions of the current US healthcare system preventing many from accessible or affordable care, the issue of how to distribute the available yet limited medical resources to those who require it has grown to be increasingly complex (Mukherjee, 2016). As mentioned earlier, crowding often forces medical professionals to turn away patients whose conditions they deem less urgent; this is inherently an unfair process, as there is no distinct ground on which these decisions are made (Micheslon et al., 2012). The overall process of allocating health services to those who require them is unjust, yet there is often no other alternative due to the complex nature of the healthcare system.

2.2 Lighting

A fundamental responsibility of workplace environments is to support the personal needs of employees who work within them, in regards to maintaining and improving staff's physiological and behavioral health, and creating a positive workplace (Manion, 2003). Though important for all professional industries, supporting these needs is especially important in the healthcare industry, as impaired physical and psychological conditions of medical staff can often have severe repercussions on the health and safety of patients (Yassi & Hancock, 2005). Ambient lighting conditions can have tremendous impact on the physiological and psychological states and processes of medical staff, involving sleep patterns, mood, social interaction, and overall behavioral health (Iwata et al., 1997; Smolders, de Kort, & Cluitmans, 2012). When lighting conditions are optimized, medical staff members are less tired, more alert, and more communicative and social with colleagues, all of which contribute to improved workplace experience and satisfaction, as well as an improved state of staff's health and wellbeing (Aan Het Rot, Moskowitz, & Young, 2008; Zadeh, Shepley, Williams & Chung, 2014).

Lighting has proven to be one of the most important factors influencing alertness and sleepiness for staff; when individuals are exposed to bright light, less melatonin is secreted, a hormone that induces feelings of fatigue and sleepiness (Kamali & Abbas, 2012). Circadian rhythm is the 24-hour biological cycle that controls these oscillating periods of wakefulness and sleepiness – frequently referred to as an individual's "biological clock" (Stevens et al., 2007). Inadequate lighting conditions can often disrupt this cycle, inducing greater fatigue and sleepiness during work shifts. Nurses and doctors often work in shifts that can exceed over twelve hours per day, at which point performance may begin to decline (Todd, Robinson, & Reid, 1993), so it is crucial that lighting conditions minimize fatigue and that they remain alert throughout the duration of their work shifts.

Lighting also heavily influences staff mood, communication, and social interaction. When frequently exposed to bright daylight, individuals are less likely to engage in negative argumentative behaviors and more likely to have pleasant social interactions with peers and colleagues (Aan Het Rot, Moskowitz, & Young, 2008). Additionally, Zadeh, Shepley, Williams, and Chung (2014) examined the effects of daylight and windows specifically on staff performance and work outcomes, found that lighting significantly improved communication and laughter amongst hospital staff. As evidenced earlier, staff communication is a necessary component of the healthcare services industry – when nurses and physicians have improved mood, they are more likely to experience improved interactions with colleagues. In healthcare facilities with increased day lighting through quantity of windows, staff experience increased communication ($p < 0.0001$) and increased laughter ($p = 0.03$), most likely due to improved mood and mental state.

Lighting also influences staff performance and daily work responsibilities, thereby impacting work environment safety and task-related errors. Workplace performance is directly affected by faults in the biological processes discussed earlier; when medical staff experience increased fatigue, decreased mood, and less interpersonal communication, their performance suffers (Iwata et al., 1997; Mills, Tomkins, & Schlangen, 2007). Lighting conditions, including lighting level, type of light source, light color, and mix of artificial light and daylight, have the potential to strongly influence the competency of medical staff in carrying out workplace responsibilities, and influence outcomes such as efficiency and acuity of task performance (Kamali & Abbas, 2012). Poor lighting conditions may often result in a lack of visual acuity, decrease in mood, and increase in stress, all of which compromise the ability for healthcare

providers to carry out their responsibilities in an effective, accurate manner, and subsequently protect the safety and health of patients (Mahmood, Chaudhury, & Valente, 2011).

In the medical profession, burnout occurs when nurses and doctors are pushed beyond what they are emotionally and physically capable of while on the job (Alimoglu & Donmez, 2004). Studies have demonstrated how elements of the physical environment can reduce or exacerbate employee burnout; lighting can be a particular predictor of job burnout. Alimoglu and Donmez (2004) established a relationship between daylight from windows and frequency of errors. Results showed that while lack of windows and decreased day lighting does not necessarily cause burnout, there is a strong association between increased presence of daylight and reduced frequency and levels of burnout amongst hospital nurses. The study suggests that the presence of windows in the workplace – supporting visual connection to the outdoor environment and nature – can help alleviate issues related to job burnout. Moreover, results of the study demonstrated that exposure to daylight for at least three hours a day (some nurses and doctors spend upwards of twelve hour work shifts without daylight exposure if facilities are windowless) was beneficial in decreasing levels of stress and increasing workplace satisfaction. They concluded that when job burnout is reduced, nurses and doctors feel less emotionally exhausted and more accomplished, contributing to increased workplace performance.

Job burnout in healthcare facilities often results in medication errors, defined as preventable, inappropriate use of medications (Hughes & Ortiz, 2005) which result from the interaction of multiple workplace factors, such as the complexity of tasks, work culture, and physical environment (Mahmood, Chaudhury, & Valente, 2011). Healthcare environments require nurses and doctors to perform physically and psychologically taxing tasks, such as standing on their feet without break for countless hours a day, or assisting with complicated

medical procedures. These tasks often result in burnout, cognitive impairment, and increased error from carelessness and fatigue. Medication errors related to deteriorated work performance can include, but are not limited to, prescribing, ordering, transcribing, or administering medications (Hughes & Ortiz, 2005). When lighting conditions are less than ideal, the likelihood of a medication error by a staff member increases. Fatigue and burnout may cause errors such as illegible handwriting, absent-minded prescriptions, and failure to correctly administer medication dosage to patients – while errors may seem small upon their occurrence, they can have tremendous implications for the health and safety of patients. The simple misreading of a prescription and subsequent incorrect order by a nurse or doctor may jeopardize patient health as a result of overdose, over-sedation, or allergic reactions (Hughes & Ortiz, 2005).

Similarly, a study by Mahmood, Chaudhury, and Valente (2011) investigated relationships between medical errors and characteristics of the physical environment, including inadequate lighting levels in nursing stations, lack of space in medication room, and inappropriate or insufficient medication dispensation equipment. Poor lighting in the medication room was one of the primary reasons for medical error due to decreased visibility; subsequently, adequate lighting levels was one of the most frequently reported solutions amongst hospital staff. This suggests that improving the lighting conditions, as well as other physical environmental variables such as reduction of noise levels and increase in physical workspace, may improve visibility and cognitive functioning and reduce the potential and frequency of medication errors made. Additionally, the reported frequency of medication errors may be higher than what is currently estimated, as medical staff members may not report all errors. There is evidence that only a fraction of errors are recorded – roughly 25 - 47% of total errors that occur (Zadeh, Shepley, Evans, & Chung, 2014). In light of this data, one could estimate that lighting, as well as

other environmental conditions, may induce medical errors more frequently than what is already assumed.

2.3 Noise

Noise levels tend to be particularly high in pediatric units; the higher likelihood of crying or distressed children adds to existing noise from sources such as staff and family conversations, alarms from pagers and other communication devices, and noise generated from equipment like IV pumps and monitors (Kinstler, 2015). The World Health Organization (WHO) and the Environmental Protection Agency (EPA) recommend that sound levels in healthcare environments not exceed 40 - 45 decibels (dB); however, many health facilities far exceed this threshold, more often falling in the range of 50 - 100 dB (Weatherhead, Niedner, Kahoud,& Kawai, 2016). Research has shown unwanted but unavoidable ambient noise disturbances to have consequences for staff within healthcare environments, including increased miscommunication, stress, and job dissatisfaction.

Stringer, Haines, and Oudyk (2008) studied nurses' perceptions of noise in an operating theater. The study found that increased noise levels decreased speech intelligibility, causing communication difficulties and errors. Nurses also reported having to raise their voices to make communication more comprehensible, which in turn increased noise levels for other staff members. While this study was specific to operating rooms, it is likely that similar noise disturbances exist in pediatric units as well, and may negatively impact staff communication.

Furthermore, a study by Kinstler et al. (2015) demonstrated that noise levels in a pediatric ICU exceed recommended standards. Such levels were significantly correlated with increased heart rate amongst nurses. Similarly, a study by Daraiseh, Hoying, Vidonish, Lin, and Wagner

(2016) linked noise levels in a pediatric inpatient unit to increased heart rate amongst registered nurses, suggesting that excess noise may have negative health outcomes for staff. Moreover, the study found that the primary source of noise in the unit was staff conversations in patient rooms, which may suggest the need for discussion spaces separate from patient areas.

2.4 Staff Privacy and Respite

In healthcare environments, it is important that privacy is afforded to both patients and staff. For patients, privacy often means healing in solitude from other patients and the desire to keep their medical information and conditions confidential (Lu, Cai, & Bosch, 2016; Olsen & Sabin, 2003). For staff, however, maintaining privacy often takes the form of having private meeting rooms to discuss serious matters with colleagues and patients, as well as having respite space to periodically retreat from the stresses of work. These respite spaces, or staff lounges, have been shown to have tremendous benefits for hospital staff, particularly nurses. They not only provide staff with a private area to physically separate themselves from other hospital occupants, but also provide restorative qualities that may aid in improving work performance (Rogers, Hwang, & Scott, 2004).

A study by Nejati, Rodiek, and Shepley (2016) found the majority of surveyed nurses perceived high-quality break areas to be important in terms of their positive influence in decreasing job-related health concerns, increasing job satisfaction, and increasing job performance. Furthermore, they perceived these spaces to be more important when they perceived workplace stress levels to be higher, suggesting that respite areas may have stress-reducing implications.

Similarly, another study by Nejati et al. (2016) identified design features of staff break areas that optimize their use and their restorative benefits. The study found that use of staff break rooms is more likely if they are conveniently located to nurses' workspaces, support socialization with colleagues as well as individual retreat, and offer total privacy from patients and their families. Moreover, including physical access to outdoor elements through balconies or porches may significantly improve perceptions of these spaces' potential for restoration.

Hospital administrations are taking notice of the need for their staff to take well-deserved breaks, and are innovating new programs to support this need. A study by Stefancyk (2009) focused on a new initiative implemented by Massachusetts General Hospital, *Transforming Care at the Bedside*, which encourages nurses to take a full one-hour break away from their work environment. While nurses were initially resistant to taking time away from their work unit, they ultimately reported less fatigued and more alert while on the job, more engaged with coworkers, and more efficient. Clearly, it is important that healthcare facilities provide their staff with convenient and well-designed respite areas in order to support restorative shift breaks and improve a variety of staff outcomes.

2.5 Use of Post-Occupancy Evaluation in Healthcare Facility Design

This study sought to explore how staff at the Children's Hospital at Montefiore perceive their workplace conditions, and how these perceptions influence employee performance and satisfaction within the existing pediatric oncology unit. In better understanding how such outcomes are influenced by perceptions of the physical environment, results of this study can directly inform the redesign of Montefiore's pediatric oncology facility, as well as provide a

framework of strategies that can be implemented in future facilities of its kind. The primary method used to assess this facility is called post-occupancy evaluation.

For the past several decades, post-occupancy evaluations (POEs) have been conducted to assess the performance of buildings and their occupants following its design, construction, and use (Zimring & Reizenstein, 1980). Such evaluations provide useful and important information for designers to measure the success and effectiveness of their design goals and decisions, and if occupants utilize the space in the way architects intended. Resulting data from POEs contribute to the ever-growing emphasis on evidence-based design (EBD), a cyclical process in which design yields behaviors and data that inform future projects (Shepley, 2011). When possible to compare a new building to its predecessor, in which the occupants transfer from one space to another, pre-occupancy evaluations are conducted to serve as a basis of comparison to test if the newest design is successful in achieving its original goals (Shepley, 2011).

Post-occupancy evaluations are a commonly used method in studying the efficacy of healthcare facility design. For example, a study by Kotzer, Zacharakis, Raynolds, and Buenning (2011) involved both a pre- and post-occupancy evaluation to measure and compare staff and family satisfaction of a children's hospital in Denver, Colorado. Results demonstrated statistically significant improvements in satisfaction with the new facility's patient room layout, natural light, storage, writing surfaces, and comfort and appeal. In comparing the results of the post-occupancy evaluation with those of the pre-occupancy evaluation, researchers were able to measure relative improvement of a variety of design elements, which indicated a successful redesign of the new facility as compared to the old. Without pre- and post-occupancy evaluation, there would be few ways to realistically and systematically measure how occupants perceive and utilize buildings.

2.6 Use of Staff Surveys in Healthcare Facility Design

In addition to pre- and post-occupancy evaluations, surveys are a widely used tool in studying the effectiveness of design within hospital environments. Surveys are generally a popular method used in research, due to their distribution accessibility, relative simplicity in constructing and administering, and provision of both objective and subjective measurements of a given construct.

A study by Mroczek, Mikitarian, Viera, and Rotarius (2005) used an employee satisfaction survey to gauge hospital staff perceptions of the design of their building, and how these perceptions influence the quality of work life. Staff of the Parrish Medical Center in Titusville, Florida were asked to indicate the type of impact they believed certain physical design elements – such as natural light, pieces of artwork, and hotel-like atmosphere – had on the quality of their workplace environment. Survey results reflected which design elements were most important to the hospital staff in their contribution to a positive work environment. In this case, the most positive statements were for natural light, live music in atrium, air flow, separation of patient transport areas, and water features. Survey results such as these can be used to inform future design, as it helps identify the physical design features that make the largest difference in users' experience.

For this research study at Montefiore, the surveys provided data from individuals who work on-site and will be directly impacted by the facility's redesign. If the redesign were catered solely to patients' needs without considering those who work in the facility on a daily basis, the new space would not be nearly as successful due to its neglect of a major stakeholder – hospital staff – in the healthcare design process.

2.7 Use of Staff Focus Groups & Interviews in Healthcare Facility Design

Similarly, focus groups and interviews help provide direct information from research participants and stakeholders in a group discussion setting. Focus groups as a research method allow for an open-ended forum, facilitating more personal and candid insight into the perceived quality of healthcare workplace environments in the context of this study. Focus groups are especially effective when coupled with surveys in providing a basis of comparison between the quantitative and qualitative data collected, and may reveal more information than a pre-constructed survey would allow.

Due to protecting the privacy of patients and vulnerable families, focus groups have not been frequently conducted in hospital settings. Instead, they have been directed towards better understanding staff experiences, which provides rich insight into the practices of healthcare workers. For example, a study by Blomberg and Sahlberg-Blom (2007) used a series of 16 focus groups to better understand how oncological nurses handle difficult situations that arise in daily practices. Focus groups revealed that staff members alternate between seeking closeness and physically or emotionally distancing themselves from workplace situations. This insight was particularly helpful in better understanding the types of psychological stress nurses endure in the workplace, the coping practices they employ in an effort to marginalize that stress, and how occurrence of such stress may contribute to employee burnout.

A major advantage of focus groups is their provision of outlets for marginalized groups to express their feelings and opinions in ways they may not be able to otherwise (Morgan, 1996). In the case of Montefiore, and other hospital settings as well, hospital staff often become a marginalized group in the design process, as architects and designers tend to focus more on patient experience when considering stakeholder needs. Through conducting focus groups at

Montefiore, pediatric oncology unit staff were able to express how they perceive existing facility conditions through group discussion, providing alternative and qualitative insight into how the new facility might better support their workplace experience.

2.8 Gaps in Existing Knowledge

Existing research indisputably points to recommendations and standards for adequate physical space, proper lighting conditions, and ideal sound level thresholds, in addition to other built environment features. Yet, many health facilities fail to implement such design solutions, often due to budgetary and funding constraints. Additionally, research has exerted focus on improving psychological conditions for healthcare workers (Purdy, 2010), but less focus has been placed on suggesting how design of the physical facility might contribute to such improvement. It is important that designers, planners, and hospital administration understand how the presence, or lack, of physical environmental features impacts how facilities support the mental and physical needs of their staff. An ultimate goal of medical facilities is to deliver the highest quality of care to patients, and much of this is contingent upon providing a working environment in which staff can excel. Supporting staff health and wellbeing through the physical workplace helps promote increased workplace satisfaction and greater quality of care for patients (Purdy, 2010). In improving our understanding of how hospital staff perceive and are affected by their physical work environment, we can use research to inform real-world design practices and standards, ultimately improving the healthcare experience for all stakeholders involved – patients, families, and staff.

2.9 Hypotheses and Research Questions

Based on existing literature and basic knowledge of facility conditions at Montefiore, it is expected that a significant difference exists between the rated importance and the rated effectiveness of physical design features within the hospital. For example, while staff perceive design features such as natural daylight and window views to be important elements in workplace settings, they are not effectively incorporated into the existing space. This research sought to explore the ways in which staff members perceive the physical features of the existing pediatric oncology facility at Montefiore. The study attempted to address the following questions:

1. How do staff currently perceive the hospital as a workplace in regards to physical design features? How do these perceptions shape the quality of their workplace experience?
2. How does the rated importance of physical design features compare to their rated effectiveness in the current facility?
3. Which design features are most important in their contribution to staff workplace satisfaction? Which are least effective?
4. How does overall satisfaction with the physical workplace relate to other aspects of the workplace experience such as communication, stress, and exhaustion?
5. In what ways can the new facility improve staff workplace experience through design?

Staff serve as unique stakeholders in the hospital design process because not only do they have obvious knowledge about their own workplace experience, but they also work so closely with patients and their families that they are also able to observe and relay how those stakeholders may experience the hospital setting. For this reason, understanding their perspectives on hospital environments provides invaluable information for improving the

perceptions of healthcare experience for a wider range of users. Ultimately, the goal of this research was to inform and generate design guidelines for Montefiore's new pediatric infusion suites, as well as other facilities of its kind, that better support the needs of hospital staff.

CHAPTER THREE: METHODOLOGY

3.1 Study Site

This research was conducted at The Jerome L. Greene Day Hospital for Pediatric Hematology-Oncology, which is currently located on the third floor of the Children's Hospital at Montefiore (CHAM) on the Montefiore Moses campus in The Bronx, New York City, NY. Montefiore serves a diverse regional demographic, characterized by a relatively high unemployment rate of 8.5% and 29% of Bronx residents living in poverty (Montefiore, 2015)

Some of the greatest concerns about the existing space – expressed by faculty and facility planners, and clearly evident in simply walking through the space – involve issues of lighting and crowding. The current facility is undersized and inadequate compared to objective standards of what is required for their patient demand, with only eleven outpatient infusion bays for pediatric patients (See Figure 1). From the years of 2013 to 2015, the number of pediatrics infusion visits at Montefiore increased 15% (Montefiore, 2015) – clearly the demand is rising, yet the resources available have remained stagnant. There is limited physical spacing between each infusion bay, leaving minimal additional room for medical equipment, family members who sit with their children during chemotherapy or infusion treatment, or the medical staff who assist in their treatment. There are also no windows whatsoever to provide day lighting for patients, family, and staff. The space is noticeably dim and condensed, the exact opposite of what would be expected for a healing environment or a productive workplace environment (See Illustrations 1 – 9).

Illustration 1. Infusion Bay

Illustration 2. Triage Area

Illustration 3. Exam Room

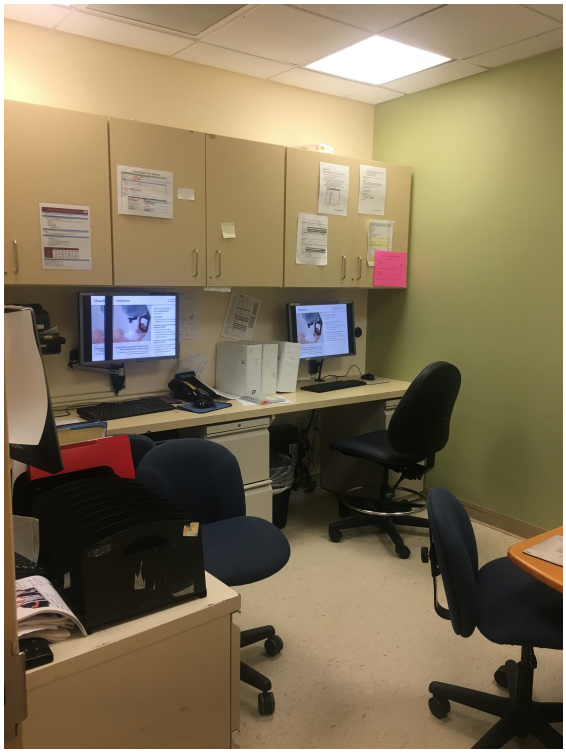


Illustration 4. Residents' Room

Illustration 5. Infusion Area Nurse's Station

Illustration 6. Refrigerator/Medical Storage

Illustration 7. Decorative Wall and Restroom Entry

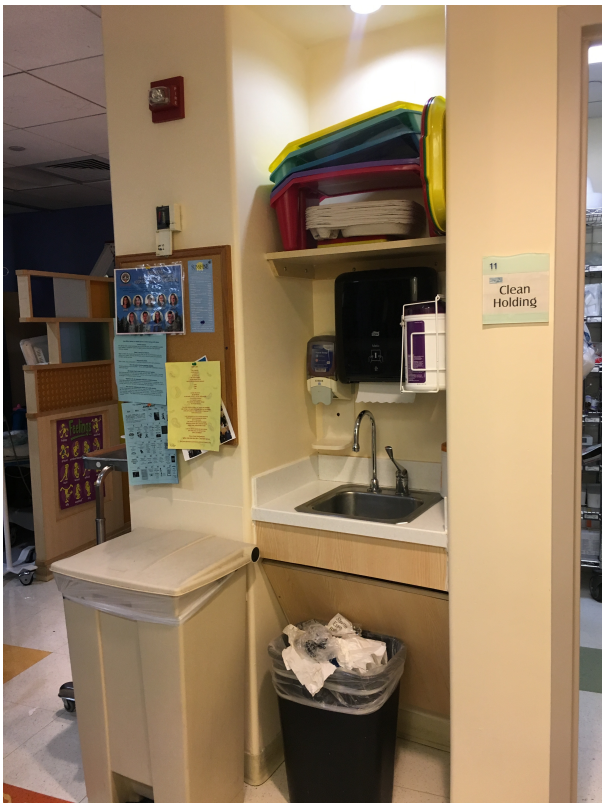


Illustration 8. Excess Supply Storage A

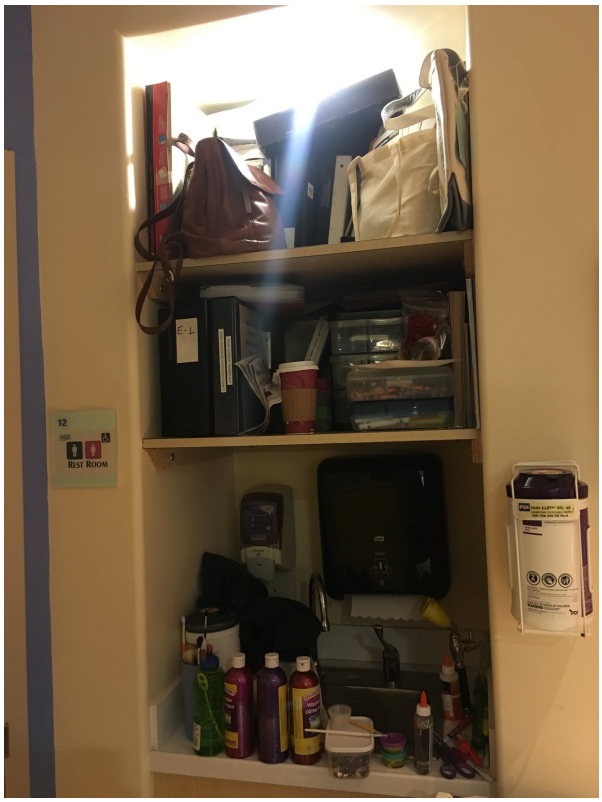


Illustration 9. Excess Supply Storage B

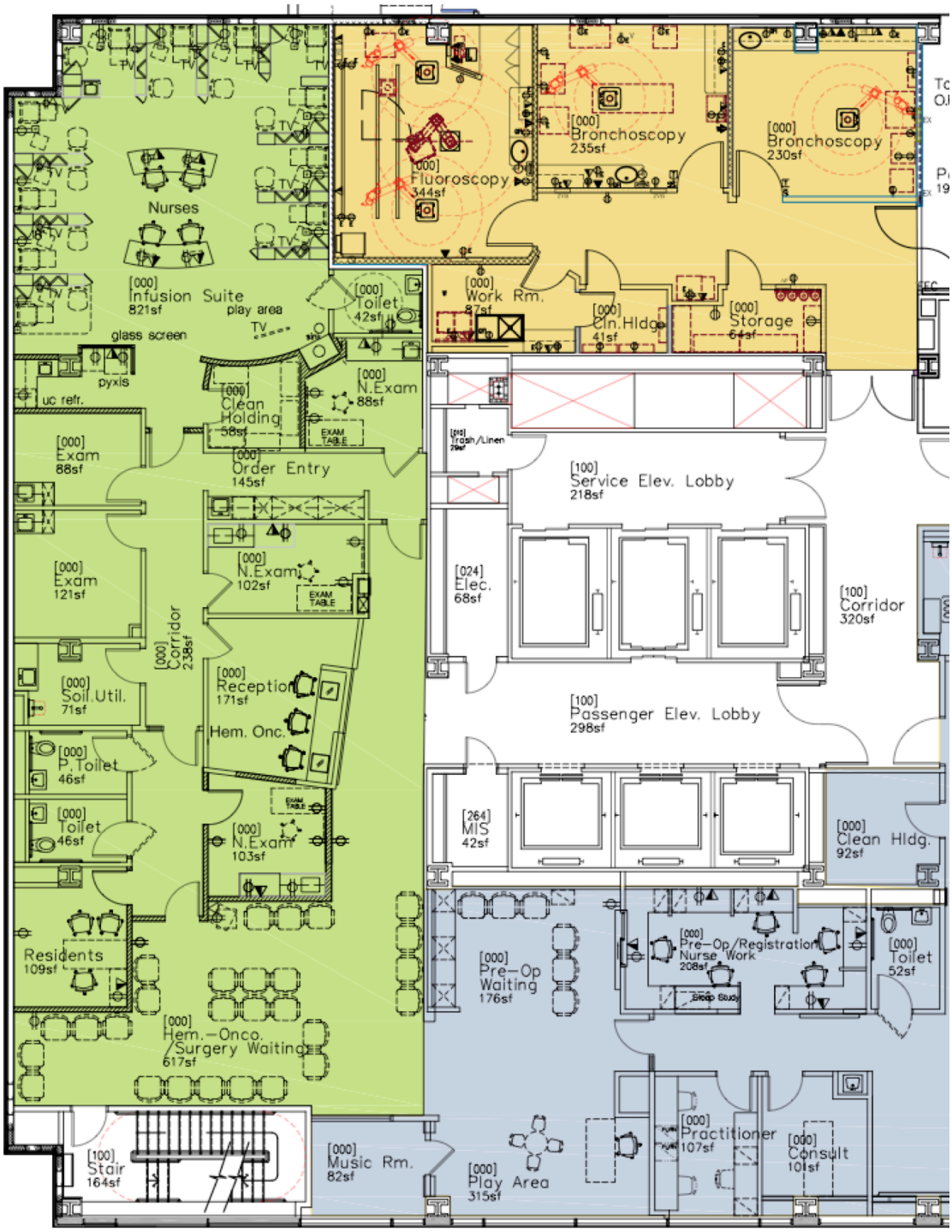


Figure 1. Existing Pediatric Oncology Facility Floor Plan (highlighted in green)

The Jerome L. Greene Day Hospital for Pediatric Hematology-Oncology (JLGDH) is planned to relocate to a refurbished facility on the third and fourth floors of CHAM's Rosenthal Wing (See Appendix G for floor plans). The new location affords staff and patients the opportunity to experience a redesigned, higher quality healthcare environment for outpatient infusion care. The new facility, which is set to open in 2018, also provides the unique opportunity to directly compare the performance of the current space to that of the forthcoming space through a pre- and post-occupancy evaluation research process, the second phase of which will be conducted following the opening of the new facility.

3.2 Study Design and Sample

This mixed-methods design approach involved three separate measures – survey (N = 35), focus groups (N = 12), and interviews (N = 3) – involving key stakeholders in the redesign of the pediatric oncology facility: Montefiore staff and the project architects. Fifty-four staff members from JLGDH were recruited for the survey and focus groups as a convenience sample by the lead doctor associated with this project, the Director of Pediatric Neuro-Oncology. A recruitment letter was sent as an email to the staff listserv requesting participation in both the survey and focus groups.

Additionally, two interviews – one over the phone and one in-person – were conducted with employees of Perkins Eastman, the architects who are undertaking the new project, to gain additional insight into the redesign and serve as a basis of comparison between the project's design goals and the needs expressed by staff.

3.3 Survey

Based on existing literature, it was determined that a survey intended to assess staff satisfaction and evaluation of the current environment would be crucial in gauging satisfaction with and perceived performance in the pediatric facility. In analyzing previous studies similar in nature (Mroczek, Mikitarian, Viera, & Rotarius, 2005; Varni et al., 2004), it was clear that there were no existing validated questionnaires to measure the variables in question for this particular study. However, there were recurring design elements and features in past research studies, such as daylight and task lighting, from which many were drawn and included in this study's survey. The survey tool was ultimately based on the structure and format of post-occupancy evaluations from similar studies evaluating perceived building performance (Mroczek et al., 2005; Shepley et al., 2017). To identify if any existing survey terminology or structure were unclear to the reader, the researcher conducted a pilot study amongst five colleagues in which they completed the survey and noted any points of misunderstanding. Based on feedback, the questionnaire was reworded accordingly to prevent confusion amongst research participants. The final survey was constructed and administered online through the Cornell Survey Qualtrics website.

The final instrument was a questionnaire divided into three main themes and a total of 14 questions, developed using a seven-point Likert scale of agreement, importance, and effectiveness to measure staff evaluation of the built environment with regards to the variables of interest (See Appendix A). The first set of questionnaire items asked participants to mark their level of agreement with statements about the physical workplace environment (See Figure 2). For example, "The physical facility supports my daily job responsibilities." The second set of questionnaire items asked staff to rate perceived *importance* of twelve physical environmental features (1= not at all important, 7 = critically important); the third set asked them to rate perceived *effectiveness* of those features within the current environment (1 = not at all effective,

7 = completely effective; See Figures 3 and 4). The twelve features of interest were selected based on the literature review on supportive healthcare environments and included: comfortable furniture, attractive furniture, damage-resistant furniture, good electrical lighting, good natural day lighting, visual positive distractions (e.g., artwork/photography), lounge space for staff respite, window views, hotel-like environment, quiet environment, good task lighting, and work areas to concentrate. To help distinguish importance from effectiveness, clarifying definition sentences were provided, i.e., "By important, we mean how critical these features are to the support of staff" and "By effective, we mean how well your current facility incorporates these features in the physical environment." To avoid the risk of positive affect, in which participants would rate all design features as critically important, an additional question was added asking participants to rank the features in order of importance to them. Demographic data about the participants, such as age, gender, and job position, were also collected at the end of the questionnaire. An open-ended comment box was also provided requesting additional suggestions for the facility redesign.

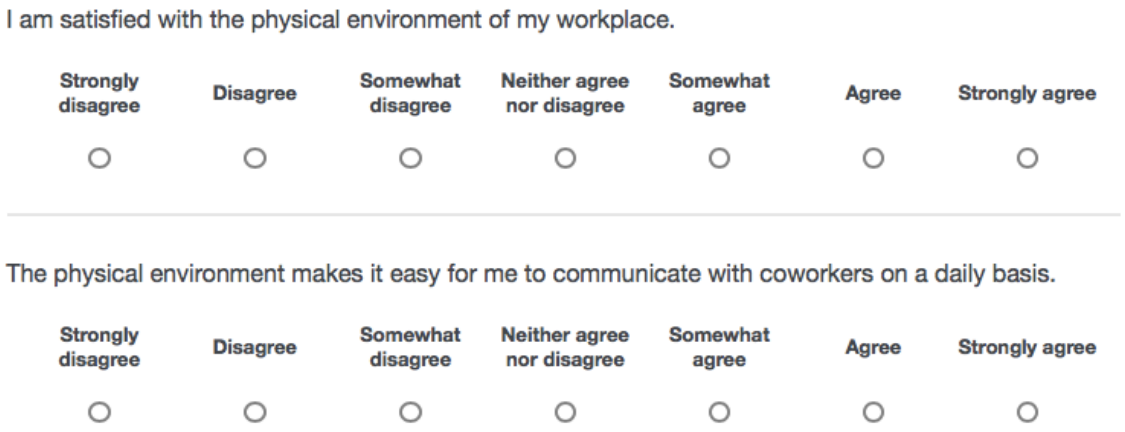


Figure 2. Excerpt of Questionnaire Agreement Statements

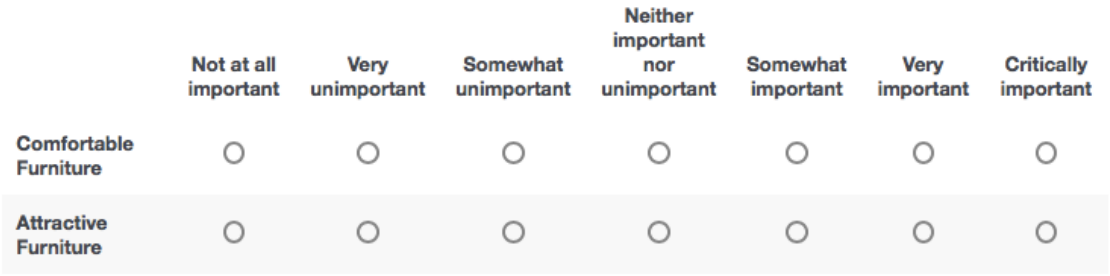


Figure 3. Excerpt of Questionnaire Importance Rating

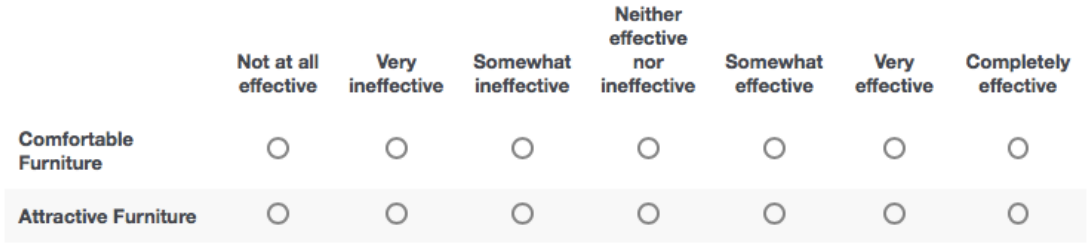


Figure 4. Excerpt of Questionnaire Effectiveness Rating

Statistical analysis of survey results involved paired-sample t-tests with each individual design element (e.g. comparing importance rating with effectiveness rating of having comfortable furniture in the workplace). Correlations were also calculated between variables of interest reflected in the statements about the physical workplace, such as overall rating of workplace satisfaction with rating of feelings of stress and exhaustion. Descriptive comparisons of means were calculated to identify which design elements were rated most important and most effective. Additionally, remarks from the open-ended comment box were grouped thematically based on recurring topics that emerged from the comments.

3.4 Focus Groups

3.4.1 Participants

A series of three focus groups were conducted to provide a more open-ended forum for staff members to verbalize problems they experience with the space, as well as suggest or express design elements they wish they had. The focus group sample involved a total of 12 participants (11 females, 1 male), across the three separate sessions. For confidentiality purposes staff names were not provided in the survey, therefore it was unclear how many staff participated in both the survey and the focus group.

3.4.2 Location and Procedure

The first focus group took place in a conference room on the ninth floor of 3411 Wayne Avenue, an office building at Montefiore, and lasted approximately one hour. The second and third focus groups were conducted more informally, taking place in the current infusion suite with staff during their shifts. Each focus group was comprised of a mix of staff positions to allow for multiple workplace perspectives. During each focus group session, the researcher acted as the moderator and asked participants open-ended questions that prompted group discussion. Examples of such questions included: *What does a typical day look like for you in the pediatric oncology unit? What do you like or dislike about your workplace environment?* Throughout the discussion, the moderator asked follow-up questions to further clarify or elaborate discussion points. For example: *Can you describe that in more detail? Can you please provide an example of a time you felt that way?*

The focus groups were recorded using both a smart tablet recorder app and smartphone voice recorder. They were later transcribed through online audio transcription services, two through Scribie and, due to low quality audio recording, one through Rev. To quantify the qualitative data, the principal investigator coded the transcribed text on ATLAS.ti software using the constant comparison analysis method, developed by Glaser and Strauss (Glaser & Strauss,

1967). This method is popularly used for analyzing qualitative data and involves the grouping and subgrouping of smaller qualitative units into larger themes to draw connections between separate instances (e.g., thematically connecting different comments in interviews made by different people).

The constant comparison technique is comprised of three stages: open coding, axial coding, and selective coding. First, in open coding, the researcher denotes a code (e.g., feeling tired) to each of the units described in a session (e.g., participant expresses feeling exhausted after a long work day). Second, in axial coding, the researcher groups similar codes (e.g., feeling tired) into categories (e.g., all participants' expressions of feeling tired or stressed). Lastly, in selective coding, the researcher develops themes that define each of the groups' content (e.g., job burnout). This method was performed for each separate focus group, and again across the three combined focus groups to identify and assess recurring themes amongst participants.

3.5 Interviews

A telephone interview was conducted with one of the project architects from Perkins Eastman. In addition, an in-person interview was conducted with another project architect and a design researcher from the firm. The telephone interview took place between the principal investigator (PI) and an architect on a speakerphone in an office space in Martha Van Rensselaer Hall on Cornell University's campus; the in-person interview took place at Perkins Eastman's Manhattan office. Interviews were recorded on both a smartphone voice recorder and QuickTime software on a laptop. The conversational interviews sought to further understand the original design goals and architectural intentions when redesigning the facility, and compare the architects' motives with the needs expressed by staff members in focus groups. Examples of

questions asked during the interview were: *What were your primary design goals for the facility's redesign? In what ways did you involve stakeholders in developing these goals?* The PI transcribed the phone interview on Microsoft Word; however, the in-person interview was transcribed through Scribie. The PI then coded the transcriptions using constant comparison analysis via ATLAS.ti software.

The research was approved by the Human Subjects Review Board at Cornell University and the Institutional Review Board at Albert Einstein College of Medicine, the human subjects review authority for research projects conducted at Montefiore Medical Center.

CHAPTER FOUR: RESULTS

4.1 Survey

4.1.1 Demographic Data

The online survey yielded a 65% response rate; 35 participants (29 females, 5 males, 1 N/A) responded to the survey out of a total 54 email recipients. Survey respondents represented a wide range of job positions within the unit (see Figure 4). The average age of survey participants was 39.8 years. The distribution of work shift hours ranged from 1 – 2 hours to over 10 hours (see Figure 5), the majority working 6 – 8 hours or longer. Not every participant answered every survey item, resulting in some items receiving a different number of responses; however, no item received fewer than 32 responses.

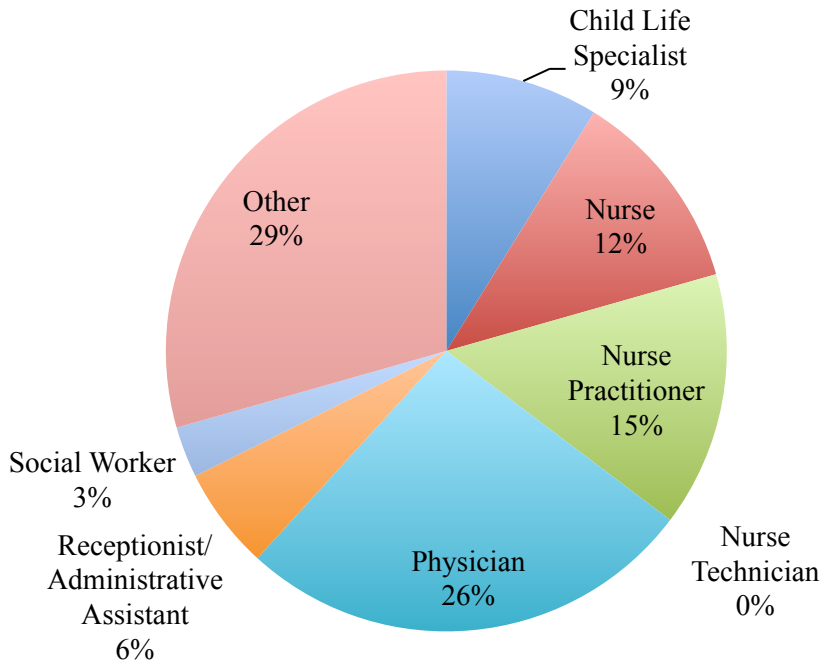


Figure 5. Distribution of Respondents' Employee Positions

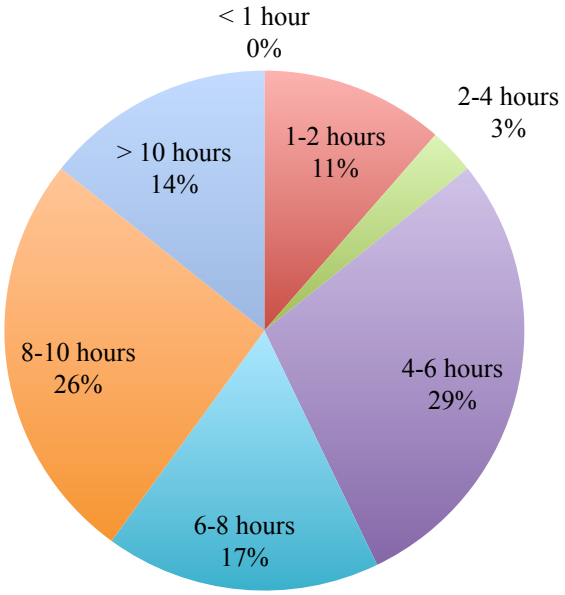


Figure 6. Distribution of Respondents' Typical Work Shift Length

4.1.2 Responses Regarding the Physical Environment

When calculating the distribution percentages of respondents' agreement and disagreement with statements about the physical facility (see Table 1), descriptive results revealed generally negative perceptions of the workplace environment. Eighty percent of respondents reported feeling dissatisfied with the physical environment of their workplace (M = 2.51, SD = 1.34), and over 50% feel that the physical environment makes it difficult to communicate with coworkers (M = 3.57, SD = 1.90). Over 60% of respondents feel that the physical facility does not support their daily job responsibilities (M = 2.97, SD = 1.60), and over 80% of respondents attribute crowding to preventing them from carrying out their job to the best of their ability (M = 5.69, SD = 1.62). Over 75% of respondents report working in the facility

makes them feel stressed (M = 5.37, SD = 1.21); an almost equal percentage report feeling tired from working in the facility (M = 5.69, SD = 1.62).

Table 1. Percentages of Agreement and Disagreement with Physical Facility Statements

Statement	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree	*N*
I am satisfied with the physical environment of my workplace	22.9%	37.1%	20.0%	8.6%	8.6%	2.9%	0.0%	35
The physical environment makes it easy for me to communicate with coworkers on a daily basis	20.0%	14.3%	17.1%	11.4%	11.4%	25.7%	0.0%	35
The physical facility supports my daily job responsibilities	17.7%	32.4%	17.7%	8.8%	14.7%	8.8%	0.0%	34
Crowding in the pediatric oncology facility prevents me from doing my job to the best of my ability	2.9%	5.9%	2.9%	5.9%	14.7%	29.4%	41.2%	35
Working in the pediatric oncology facility often makes me feel stressed	0.0%	0.0%	8.8%	14.7%	29.4%	29.4%	20.6%	35
Working in the pediatric oncology facility often makes me feel tired	0.0%	5.9%	5.9%	14.7%	29.4%	38.2%	8.8%	35

Note: 1 = Strongly Disagree, 7 = Strongly Agree

4.1.3 Relationships Between Satisfaction and Stress, Exhaustion, Communication, Crowding, and Support

Pearson correlations were calculated to determine the relationships between staff members' overall satisfaction with the physical work environment and the five other variables of interest: feelings of stress, exhaustion, ability to effectively communicate with coworkers,

crowding as a barrier to job effectiveness, and ability to carry out job responsibilities (see Table 2). Of the five associated statements, four of them had statistically significant correlations with overall satisfaction.

Table 2. Pearson Correlation Coefficients

		Communication	Support Responsibilities	Crowding	Stress	Tired
Satisfaction	Pearson Correlation	.634**	.705**	-.303	-.429*	-.345*
	Sig. (2-tailed)	.000	.000	.077	.010	.042
	N	35	34	35	35	35

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Results revealed a statistically significant correlation between overall satisfaction with the physical environment and perception of the physical environment facilitating communication with coworkers ($R = 0.634$, $p < 0.01$). This suggests that the less satisfied one feels with their workplace environment, the less they will perceive the environment as supporting communication. Similarly, the less they feel the workplace supports communication, the less satisfied they are with the physical environment. Perception of the physical facility supporting daily job responsibilities was also significantly correlated with overall satisfaction ($R = 0.705$, $p < 0.01$). This suggests that satisfaction with a physical workplace is closely linked to the facility supporting job responsibilities.

Results revealed statistically significant negative correlations between overall satisfaction with the physical environment and feeling stressed ($R = -0.429$, $p < 0.05$) and feeling tired ($R = -0.345$, $p < 0.05$). This suggests that staff who feel more stressed or tired are likely to be less

satisfied with their physical workplace environments. Conversely, dissatisfaction with the physical workplace may contribute to greater feelings of stress and exhaustion. There was no significant correlation determined between crowding as a barrier to job responsibilities and overall satisfaction with the physical workplace environment (R = - 0.303, p = 0.077).

4.1.4 Importance versus Effectiveness

Paired samples means were calculated to compare the importance and effectiveness ratings for each physical design feature (see Table 3). Analysis of mean importance scores indicated a range of 3.39 to 6.30 (out of a possible range of 1 [not at all important] – 7 [critically important]), suggesting that staff perceive a relatively high to very high level of importance for all physical design features. Out of the twelve features, the highest mean scores were work areas to concentrate (M = 6.30), good electrical lighting (M = 6.09), and good task lighting (M = 6.03), indicating these to be the most important physical design features to staff in terms of their contribution to a positive working environment. Visual positive distractions (M = 5.15), attractive furniture (M = 4.21), and hotel-like atmosphere (M = 3.39) received the lowest scores, suggesting them to be the least important to staff.

Analysis of mean effectiveness scores indicated a range of 2.21 to 4.58, a lower threshold than the importance scores. This suggests that staff perceive most of the physical design features to be relatively low in effectiveness, or poorly incorporated into the physical environment. Results indicated staff to perceive good electrical lighting (M = 4.58), comfortable furniture (M = 3.88), and visual positive distractions (M = 3.52) as the most effective in the existing facility. Conversely, they perceive good daylight (M = 2.45), lounge space for staff respite (M = 2.39), and hotel-like atmosphere (M = 2.21) to be the least effective.

Table 3: Paired Sample Statistics – Importance vs. Effectiveness Rating Means

		Mean	N	Std. Deviation	Std. Error Mean
Comfortable Furniture	Importance	5.64	33	.699	.122
	Effectiveness	3.88	33	1.635	.285
Attractive Furniture	Importance	4.21	33	1.244	.217
	Effectiveness	3.03	33	1.591	.277
Damage-Resistant Furniture	Importance	5.64	33	1.025	.178
	Effectiveness	3.76	33	1.786	.311
Good Electrical Lighting	Importance	6.09	33	.723	.126
	Effectiveness	4.58	33	1.582	.275
Good Daylight	Importance	5.97	33	.951	.166
	Effectiveness	2.45	33	2.123	.370
Visual Positive Distractions	Importance	5.15	33	1.064	.185
	Effectiveness	3.52	33	1.873	.326
Lounge Space for Staff Respite	Importance	5.58	33	1.001	.174
	Effectiveness	2.39	33	2.150	.374
Window Views	Importance	5.64	33	.994	.173
	Effectiveness	2.55	33	2.181	.380
Hotel-Like Atmosphere	Importance	3.39	33	1.368	.238
	Effectiveness	2.21	33	1.596	.278
Quiet Environment	Importance	5.21	33	.820	.143
	Effectiveness	2.64	33	2.013	.350
Good Task Lighting	Importance	6.03	33	.728	.127
	Effectiveness	4.09	33	1.942	.338
Work Areas Where I can Concentrate	Importance	6.30	33	.951	.166
	Effectiveness	2.88	33	2.043	.356

Note: Importance scale – 1 = not at all important, 7 = critically important; Effectiveness scale – 1 = not at all effective, 7 = completely effective

4.1.5 Importance-Effectiveness Differential

The paired sample means suggest that each of the twelve design features are perceived as being more important than they are effective (See Figure 7). Besides identifying which features are rated most and least important, and most and least effective, it is important to identify the largest differential between importance and effectiveness. That is, which physical design features are perceived as being far more important than they are effective.

The results of a paired sample t-test for difference between rated importance and rated effectiveness for each of the twelve physical design features showed statistically significant results for all twelve (See Table 4). To correct for multiple hypothesis testing, the Bonferroni correction was applied, in which threshold for significant p-values ($p < 0.05$) was adjusted by dividing by the number of tests run (12); the p-values remained statistically significant across all twelve features ($p < 0.004$). The mean differential between rated importance and rated effectiveness was calculated by averaging the differences between each individual's effectiveness rating and their importance rating. Of the 12 features, the largest mean differentials for which importance far exceeded effectiveness ($M > 3.00$) occurred for: good daylight ($M = 3.515$); work areas to concentrate ($M = 3.424$); lounge/break space for staff respite ($M = 3.182$); and window views ($M = 3.091$).

Table 4: Paired Sample T-Test Mean Differential

	Mean Differential	SD	Std. Error Mean	df	Sig. (2-tailed)
Comfortable Furniture	1.758	1.659	.289	32	.000
Attractive Furniture	1.182	1.530	.266	32	.000
Damage-Resistant	1.879	1.996	.347	32	.000

Furniture					
Good Electrical Lighting	1.515	1.584	.276	32	.000
Good Daylight	3.515	2.093	.364	32	.000
Visual Positive Distractions	1.636	1.950	.339	32	.000
Lounge Space for Staff Respite	3.182	2.200	.383	32	.000
Window Views	3.091	2.199	.383	32	.000
Hotel-Like Atmosphere	1.182	1.740	.303	32	.000
Quiet Environment	2.576	2.016	.351	32	.000
Good Task Lighting	1.939	1.936	.337	32	.000
Work Areas Where I can Concentrate	3.424	2.359	.411	32	.000

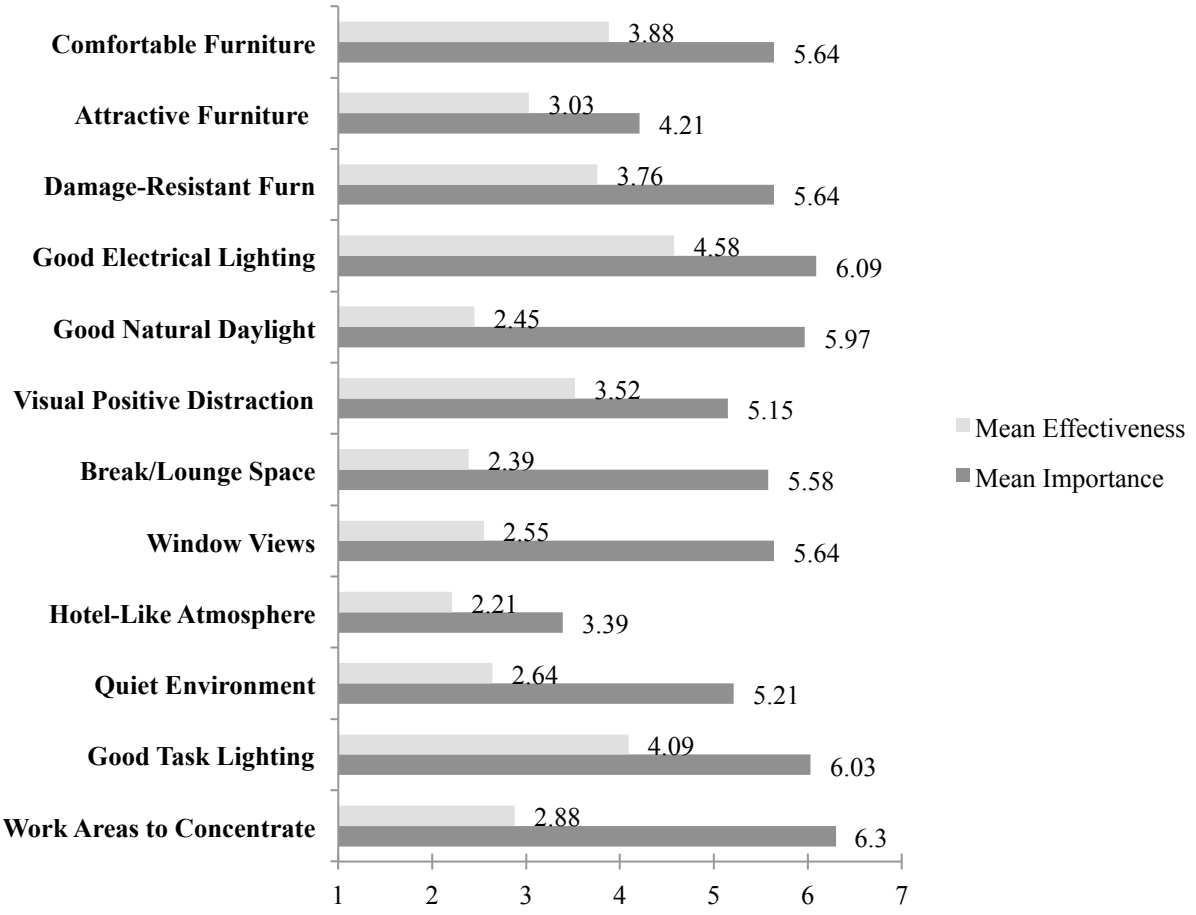


Figure 7. Mean Importance vs. Mean Effectiveness Scores

4.1.6 Survey Comments

Results of the open comment box for respondents to provide additional remarks on what would be useful in the redesign were grouped into seven recurring themes (See Table 5). Survey comments ranged across the following seven themes; one comment has been provided for each theme, but a majority of them were related to lack of space and overcrowding, as well as having adequate and designated work areas (See Appendix B).

Table 5: Survey Comment Themes

Theme	Comment Selection
Lack of Space & Overcrowding	*"There needs to be more space for our patients, at this point we have staff to see the patients we need but not actual rooms to do so. Patients have had to wait for a bed to receive their chemotherapy as the clinic space was full and that is unacceptable."*
Windows & Lighting	*"…there are NO windows and that is important for patients that spend the entire day there."*
Break/Lounge/ Relaxation Space	*"It is a critical environment I strongly believe we all can use some relaxation/meditation room/environment"*
Storage	*"A small cabinet where student and curriculum materials could be stored would also be favorable and more time efficient, as teachers are often going to other floors to pick up materials."*
Furnishing	*"Furniture should be of a fabric that can be wiped down daily, not made of cloth that and be stained by food, vomit, urine or stool."*
IT Support	*"In addition, teachers and patients would benefit from consistent wifi. This would improve our access to student materials and online courses for high school students."*
Adequate/ Designated Meeting and Work Spaces	*"a work area for the hospital teachers to meet with the patients would be helpful. As would a separate room/space where social worker can talk privately with the parent or patient (without interrupting the flow/use of the exam rooms)."*

4.2 Focus Groups

4.2.1 Participant Information

Twelve staff members participated across three separate focus groups. Participants represented a range of job positions (See Table 6). No further demographic information was collected.

Table 6. Focus Group Location and Participant Information

Focus Group	Location	Participants' Job Positions	Length (in minutes)
Group #1	Conference Room at 3411 Wayne Avenue, 9th Floor	1 pediatric oncologist (PO), 1 staff nurse (SN), 1 nurse manager (NM), 1 social worker (SW), 2 clinic school teachers (ST)	56
Group #2	On-site: JLGDH Vitals and Triage Area	2 licensed practical nurses (LPN)	10
Group #3	On-site: JLGDH Infusion Area	3 staff nurses (SN), 1 child-life specialist (CLS)	35

4.2.2 Emerging Themes

Using constant comparison analysis, five recurring themes emerged following the coding of transcribed focus group discussions (See Table 7). The most commonly raised themes pertained to issues of privacy, crowding, and storage within the workplace.

Table 7. Summary of Focus Group Themes and Findings

Theme	Subtheme	Finding	Notable Quotation
Staff Experience	Lounge/ Break Space	There is a lack of adjacent support space for staff to take a break from their work shift, relax, and eat	*"Well, there's no place to go right now… I don't remember when I took a break last"(SN)*
	Privacy	The current space does not afford users privacy when it comes to conversation or control of interaction, making staff uncomfortable during serious and difficult work responsibilities	*"…not only are they doing new diagnosis talking, but you have doctors doing end-of-life talks, in the infusion area… Right next to other patients" (SN)*
	Sense of Community	Staff may not enjoy working in the physical space, but do enjoy working in the company of their colleagues	*"I think outside of the people that work in this area and work together, there's nothing about that physical space that is worth keeping" (NM)*
	Improvisation	Staff must make do with the resources available, even though they may not be appropriate for a certain job task	*"…we use the storage room as an office, if we need to have a private conversation" (SN)*

Work Efficiency	Storage	There is inadequate space for staff to store necessary medical equipment and supplies, as well as personal belongings. As a result, staff must infringe on usable patient space to make room for these items.	"*We keep [our things] in the cubbies in [Bay 11]…We're using patient space" (SN)*
	Crowding	Limited physical space in the unit, coupled with high volumes of people (staff, patients, family members, etc.) interrupts the course of staff's work activities and provision of a high quality patient experience	*"When our clinic infusion area is full, and there's families with multiple family members with them…We will ask families to go back out to the waiting area, we'll say, 'One person come in and you can alternate coming back and forth"(SN)*
	Work Flow	The existing space does not allow for effective and efficient flow of work activities and staff movement throughout the space	*"If you have all your supplies, somebody's gonna trip over it because it's just in the way, and that's not fair to the people that are trying to get to this patient" (ST)*
	Zoning of Work Space	There is not enough designated space for the range of tasks and job responsibilities; as a result, staff struggle to balance all of them in the shared space	"*We only have one room that's like designated for the bone marrow transplant, which is Room 3, but … we have four bone marrow transplants and now we're trying to figure out what room"(LPN)*
	Maintenance	The small infusion space prevents physical separation between patients with highly contagious medical conditions, infringing on staff's ability to provide patients and themselves with a clean and safe facility	*"…when somebody gets sick we all get sick" (SN)*
Ancillary Elements	Furniture	Cleanable, maintainable furniture is needed to support hygiene in the infusion area and waiting room	" *we need furniture that can be cleaned, because they were so nasty with stains on 'em...You can't wipe anything down…" (SN)*
	Technology	There is a lack of high-performing, reliable technology in the current facility, which interferes with various job tasks throughout a given workday.	*"Right now we're running to the secretaries for them to print something, to copy something, a lot of wasted [time]"(SN)*

	Medical Equipment	Staff's responsibilities require various medical equipment, yet there is inadequate space to contain it and their placement in the space interferes with other tasks	*"…we have to go in there and we need to get a temperature. I'm not tall. Sometimes I feel like, sorry Mommy. I gotta stretch over [her], to grab the thermometer [and] the blood pressure thing" (SN)*
Patient Experience	Crowding	Limited physical space in each infusion bay prevents patients from having a high-quality, calming experience during treatment due to all the individuals in the bay at one time – patient, family, and necessary staff	*"There's also no space like they were saying in the back. Sometimes the parent doesn't wanna leave or the grandparent doesn't wanna leave the child, and so then it's the parent, the kid and the stretcher, the chair, and then me, sitting in trying to do a lesson" (ST)*
	Patient Flow	Poor adjacencies and layout of patient spaces require patients to travel far distances, making it difficult for staff to keep track of their whereabouts and direct them to their next destination	*"They get off the elevator and they check-in, then they typically get back on the elevator and go upstairs to the fourth floor to have their blood drawn. Then they come back down to the third floor and they wait..."(PO)*
	Safety & Hygiene	Lack of adequate patient support and activity spaces means using the floor for play time and sharing facilities with other contagious patients, allowing quick spread of germs	"*We played medical play for about thirty minutes. On the floor. On the dirty floor." (CLS)*
	Positive Distractions	More features should be incorporated to distract patients while undergoing long and stressful treatment processes, yet they should not negatively interfere with other patients' experience	*"Obviously this is a special clinic, so they're here longer, they're getting medicine. They're here all day that I think they need more distractions" (LPN)*
Ambient Conditions	Noise	Large quantities of people in a small and shared space causes high noise levels and sound travel, which interfere with staff and patient experience	*"Having some sort of sound absorption, something, would be amazing…because the babies crying can be traumatizing for the other families and the other kids" (SW)*
	Lighting	There are no windows in the current	*"...we've been working in a*

		space which prevents staff from access to daylight; lack of adequate task lighting makes it difficult for them to read or do more complex tasks	*clinic with no windows for about 10 years, and... [there's no] artificial light for starting IVs, placing NG tubes, placing urinary catheters…" (SN)*

4.3 Interviews

4.3.1 Participant Information

Three Perkins Eastman employees participated across two interviews (see Table 8). No further demographic information was collected. It should be noted that a large portion of the comments made by the interviewees were not directly related to this project in particular, and more about the process of using general design research to inform architecture and design.

Table 8. Interview Locations and Participant Information

Interview	Location	Participant Job Title
Interview #1 (Phone)	Martha Van Rensselaer Hall Office, Cornell University, Ithaca, NY	1 Project Architect
Interview #2 (In-person)	Perkins Eastman Office, New York, NY	1 Project Architect, 1 Design Researcher

4.3.2 Emerging Themes

Using constant comparison analysis, four recurring themes emerged following the coding of two interviews with project architects and the design researcher. (See Table 9).

Table 9: Summary of Interview Themes and Findings

Theme	Subtheme	Finding	Notable Quotation
Design Process	Budget	Project budget constraints may limit the amount of user needs that architects	*"…they have a certain budget that they have to maintain, and it's always like, 'We can't exceed it.'…we can gather all*

		can incorporate into design plans	*that information from staff, like they want this and this, but sometimes they just go beyond what's allowed…"*
	Codes	Strict architectural and facility codes/guidelines define minimum requirements and parameters for space planning	*"the New York State Department of Health has followed some codes which is the FGI guidelines, that would state what are the minimum requirements for X space"*
	Program Challenges & Building Analysis	A big architectural challenge was to plan a lengthy list of necessary facilities and amenities into the existing site structure	*"…the biggest design goal was to kind of fit the design program in what is a pretty small space and difficult building. And to work with the existing infrastructure and just to juggle the size of the existing program"*
	Stakeholder Interaction	Architects and space planners must work through hospital representatives instead of directly with users, limiting the translation of stakeholder needs into the design	*"...there's always this holdup of feedback and we're never speaking directly to the hospital staff or the doctors you know, what could maybe be a more efficient communication process"*
Staff Experience & Efficiency	Staff Support Space	Requirements for staff space are not as developed as they are for patient space — as a result, staff support space often becomes the last piece of the planning process	*"In the FGI there are minimum requirements too, for staff, but it's not as pronounced as what's required for patients"*
	Staff Work Flow	New plans incorporate a singular corridor that allows easier staff circulation and approach into patient service spaces	*"…the patient rooms are all pushed to the outside and then you have a long service corridor on the inside and the idea is that staff can have this double access on either side to patient rooms."*
	Equipment Storage	The new space will incorporate more storage areas to accommodate staff's equipment needs	*"…in the new space, they'll have a whole wall of cabinetry with a built thing and a wardrobe so a lot of the clutter can be put away"*
Treatment Area	Patient Entry	The patient entry sequence into the new treatment facility has been redesigned so that it will	*"…we were also focusing on how to create a nice entry sequence…. [Patients] are led in through a nice elevator lobby and into the pretty open waiting area,*

		be more welcoming and easier to navigate	*[which] was also a priority"*
	Infusion Area	Increased square footage in the infusion area will allow each patient to have more personal space to fit staff, family members, and other supporting features	*"...there are enough chairs right next to the patient, and the dynamic of how a doctor will talk to parents and the patient at the same time, all of that was discussed as well"*
	Space Designation	The new facility will provide more adequate designated spaces for the variety of services provided by the unit, and physical separation of spaces that do not need to be shared	*"...fourth floor, it's for basic infusion services, and floor three, I believe there are exam rooms for hematology-oncology patients"*
Positive Distractions	Decor	There will be an addition of more decorative elements in the design of the new facility	*"...we came up with a sort of stacked playful decorative column feature, I think we'll bring that circular theme throughout the ceiling plan with lighting in the public spaces"*
	Windows	The new facility will provide daylight in every patient room, since they are placed along the perimeter of the building floor plate	*"...every room has a window"*
	Technology	Patients will have access to entertainment devices to distract them and alleviate stress during infusion	*"...there's a TV that drops, for the infusion bays it's on the wall of the door…And that will be this whole interactive gaming system [for patients]"*

CHAPTER FIVE: DISCUSSION

5.1 Summary of Research Goals

This mixed-methods evaluation study tested how staff members at the Jerome L. Greene Day Hospital for Pediatric Hematology and Oncology at the Children's Hospital at Montefiore perceive their workplace, and how these perceptions relate to workplace performance and satisfaction. Furthermore, the study sought to identify the difference between perceived importance and effectiveness of several physical environment features, as well as establish connections between satisfaction (or dissatisfaction) with the physical environment and feelings of stress, exhaustion, and communication. In doing so, this research sought to generate relevant design guidelines for the forthcoming relocation and redesign of Montefiore's pediatric oncology unit.

5.2 Staff perceptions of physical design

Research question: How do staff currently perceive the hospital as a workplace in regards to physical design features? How do these perceptions shape the quality of their workplace experience?

Based on staff responses regarding the physical environment in both the survey and focus groups, it is evident that there are negative perceptions of the current physical workplace. A large majority of respondents are unsatisfied with the physical environment, and feel that conditions of the physical environment interfere with their ability to carry out their job to the best of their ability. Additionally, their negative perceptions are strongly associated with work-related variables such as feelings of stress and exhaustion, and interfere with their ability to best perform

job responsibilities. Research has suggested that it is important for staff to perceive their workplace in a positive way, as optimism towards the workplace increases staff productivity and wellbeing, and improves patients' perception of quality of care (Mourshed & Zhao, 2012; Swain, 2016). Though staff report enjoying the sense of community amongst colleagues, the social element is not enough to outweigh the various concerns with how the physical environment interferes with workplace responsibilities. While several workplace variables may contribute to generating positive staff perceptions, facility design plays one of the most critical roles, as the built environment of the workplace provides the physical framework in which job functions are performed and healthcare is provided (Mroczek et al., 2005). This being said, the new physical must be positively perceived, so as to create a more positive, productive, and supportive workplace for its staff.

5.3 Physical Environment Feature Ratings: Importance Versus Effectiveness

Research questions: How does the rated importance of physical design features compare to their rated effectiveness in the current facility? Which design features are most important in their contribution to staff workplace satisfaction? Which are least effective?

Comparing importance to effectiveness has been identified by previous researchers (e.g. Shepley, et al., 2017) as an appropriate means of evaluating a physical environment. A noteworthy finding of this study was the statistically significant difference between perceived importance and perceived effectiveness of all twelve physical environment features identified in the survey. This is particularly important because it supports the hypothesis that there is a salient divide between staff opinions of how important these features are in contributing to a positive working environment and how present these features are in the current facility. The features

rated as most important were work areas to support tasks involving concentration, good electrical lighting, and good task lighting. The features rated as least effective were good daylight, lounge/break space for staff respite, and hotel-like atmosphere.

In addition to identifying staff rankings of importance and effectiveness for physical design features, this study also identified the features that received the largest differential between importance and effectiveness – that is, rated most important but comparatively least effective. They are good daylight, work areas to concentrate, lounge/break space for staff respite, and window views. This differential is important because it points to where gaps between importance and effectiveness are widest, and suggests where design solutions may be most successful.

5.3.1 Good Daylight

The largest differential between rated importance and effectiveness was for good daylight, which can be attributed to the complete lack of windows in the existing facility. Staff perceive daylight to be an important feature in creating a positive work environment, yet the facility is ineffective in incorporating it. Research has pointed to the importance of daylight in healthcare environments for staff, as it helps regulate circadian rhythm and keeps staff members alert and focused during long shifts involving precise medical tasks (Simmons, Graves, & Flynn, 2009; Efinger, Nelson, & Walsh, 1995). Due to the total absence of daylight exposure in the current facility, staff may feel more lethargic and experience greater cognitive trouble with work-related tasks; subsequently, this impedes their ability to provide the safest and highest quality care for patients. Therefore, it is critical that the new facility better incorporates daylight in order to avoid these consequences.

5.3.2 Work Areas that Support Tasks Involving Concentration

Montefiore staff perceive the facility to be ineffective in providing work areas where they can concentrate, a feature they view as highly important in contributing to a positive workplace. High volumes of patients in a small facility, minimal privacy, and subsequent high levels of ambient noise contribute to the lack of adequate space for staff to perform concentrated work. Concentration is a crucial factor in staff productivity and accuracy, especially in healthcare settings where tasks must be carried out with upmost precision (Padmakumar et al., 2017). Conversely, a lack of ability to focus is often associated with job stress and burnout, which is highly prevalent amongst pediatric oncology specialists (Liakopolou et al., 2007). Furthermore, providing quiet spaces where staff can focus has shown to reduce stress amongst nurses (Riemer, Mates, Ryan, & Schleder, 2015). Evidently, the new facility should provide workspace for staff to concentrate on job tasks so that focused productivity can be optimized, and stress and errors can be minimized.

5.3.3 Lounge/Break Space for Staff Respite

Survey results also revealed a large difference between importance and effectiveness ratings of a staff lounge space. There is currently no adjacent space within or near the facility for staff to take a break from their work shift; as a result, they use unoccupied patient space or storage rooms to retreat, spend unnecessary time traveling to other hospital floors' lounges, or do not take breaks at all. This is problematic, as staff that work in stressful environments depend on such congregate spaces for relaxing, eating, and socializing. For example, studies have shown staff lounges in healthcare environments to be largely beneficial in improving staff cognition, morale, satisfaction, and wellbeing (Karlin & Zeiss, 2006; Lemaire et al., 2010; Witkoski & Dickson, 2010). The provision of staff lounge space is critical to maintain staff resilience, mitigate workplace stress and exhaustion, and support their ability to cope with the often taxing

and emotionally exhausting job responsibilities in pediatric oncology (Zander, Hutton, & King, 2010). As such, better incorporation of staff lounge amenities in the new facility is imperative.

5.3.4 Window Views

Similar to daylight, the lack of windows most likely resulted in the window views demonstrating a large differential between importance and effectiveness ratings. In addition to the provision of daylight, as discussed earlier, window views also provide views to the outdoors, often involving forms of nature such as trees, greenery, and weather conditions. Staff members noted in focus groups that work shifts often require them to begin work in the early morning and leave work late at night; both times when it is dark outside. Providing windows in the new facility would better support temporal orientation throughout the course of the workday. Research has shown window views to provide significant restorative value for occupants in healthcare environments, staff and patients alike (Nejati, Rodiek, & Shepley, 2016; Ulrich et al., 2008). For staff, views of the outdoors is particularly important, as visual access to natural elements like trees and foliage may lessen the negative impacts of work-related stress (Leather, Pyrgas, Beale, & Lawrence, 1998) and improve workplace satisfaction and perceptions (Dravigne, Waliczek, Lineberger, & Zajicek, 2008). Montefiore's location in an urban setting may prevent views of nature in the traditional sense, such as forestry, water, and gardens; nonetheless, incorporation of window views would allow for the experience of weather (rain, snow, sunshine), and certainly provide more restorative benefits than the existing facility currently affords.

5.4 Satisfaction, Exhaustion, Stress, & Communication

Research question: How does overall satisfaction with the physical workplace relate to other aspects of the workplace experience such as communication, stress, and exhaustion?

This study also sought to determine relationships between overall satisfaction with the physical workplace and other workplace variables. Results revealed that staff satisfaction with the physical environment was strongly negatively correlated with communication barriers, stress, and exhaustion. The direction of causality in these variables is unknown, but it is likely reciprocal. On one hand, staff feelings of stress, exhaustion, and inability to effectively communicate may cause them to have more negative opinions about the physical environment. On the other, their negative perceptions of the workplace may contribute to and heighten the presence of these outcomes. Regardless, the link is clear: stress, exhaustion, and barriers to communication play palpable roles in undermining staff satisfaction with their physical work environment.

Several studies have drawn connections between workplace satisfaction and these variables at an organizational level (Gray-Toft & Anderson, 1981; Kovner, Brewer, Wu, Cheng, & Suzuki, 2006) as well as an environmental level (Varni et al., 2004): when staff feel stressed and tired on the job, productivity and efficiency are compromised. There are few studies that address how satisfaction with the physical environment may mediate the relationship. However, it is evident that more positive perceptions of the physical environment will improve workplace satisfaction, therefore improving conditions of stress, exhaustion, and communication amongst staff.

The staff of JLGDH work in a potentially stressful and psychologically exhausting environment that involves the diagnosis and treatment of extremely sick children. This type of

environment is emotionally demanding for staff, as well as for the patients and families that seek medical care. The close affiliation staff have with dying patients, both physically and emotionally, acts as a major source of stress in the workplace (Gray-Toft & Anderson, 1981; Mukherjee, Beresford, Glaser & Sloper, 2009). This is especially relevant within a pediatric oncology unit, as staff may feel morally distressed and helpless in situations where patients' health fails to improve (Gray-Toft & Anderson, 1981; Pye, 2013). Several environmental factors may also contribute to stressful working conditions. Montefiore staff expressed issues such as troubles with unreliable medical equipment and technology, lack of space to have a private conversation with coworkers or patients, and crowding within the facility. All of these physical factors can be considered workplace stressors, and the failure of the physical environment to support job responsibilities only adds to the uniquely stressful practice of pediatric oncology. Though improvements in the physical environment would not change the inherent difficulty of treating sick patients, they may better support staff needs so that the emotional demands are not as taxing, as well as make them feel more adequately prepared to meet such demands.

One finding that was unexpected was the insignificant correlation between perception of crowding as a barrier to job performance and overall satisfaction with the physical environment. In spite of the findings of Asplin, *et al*. (2003), McCarthy, *et al.* (2012), Michelson, *et al*. (2012), and Rowe (2006), which focused on the effect of crowding mainly in emergency departments, it is possible that crowding does not have as negative of an impact on workplace satisfaction within pediatric oncology facilities as hypothesized. This finding may also be due to staff's different interpretation of the term "crowding" within the context of the survey, as issues of crowding were brought up several times by staff members during focus groups.

5.5 Other Important Findings

Beyond the original goals of this study, findings revealed important information relevant to this research.

5.5.1 Divide Between Stakeholders and Architects

Interviews with architects were intended to further explore the development of design goals. While additional insight was certainly provided, interviews also revealed pertinent realities of the design process. Firstly, facility codes and budget constraints present major obstacles in the design and planning process, especially when it comes to staff needs. Healthcare facilities follow the 2014 edition of *Guidelines for Design and Construction of Hospitals and Outpatient Facilities*, published by the Facility Guidelines Institute (Facility Guidelines Institute, 2017). These guidelines enforce minimum recommended needs for clinical facilities and their support areas, including general program, space, construction details, furnishings, and infection prevention (Facility Guidelines Institute, 2017). During interviews, architects explained that many of the health facility codes and guidelines outlined in the document emphasize patient spaces first. As a result, staff support spaces may become an addendum to patient amenities, often resulting in them being too small in size, ineffective, or completely nonexistent (Shepley & Wilson, 1999). Given the existing footprint of the Rosenthal wing, though larger than where the unit currently resides, the planning of mandatory program spaces and their required minimum square footages into the new facility may interfere with architects' ability to provide staff with the level of secondary support space they desire.

Secondly, while it is ideal for architects to directly communicate with stakeholders, often this is not the case. Instead, various "degrees of separation" and briefing documents, summaries of client needs and facility requirements, divide the architects from the individuals who will be

directly impacted by the physical environment (Bogers, van Meel, & van der Voordt, 2008). In the case of this design process, architects communicated mostly with Montefiore's facility planners but rarely the staff members themselves. As a result, there is a two-part interpretation of needs: from stakeholders to facility representatives, and from representatives to architects. This may result in the inevitable dilution of needs across the phases of communication, and fewer stakeholder opinions translated into tangible design practices. This researcher's hope is that this study will help fill the gaps of communication to ensure inclusion of staff needs in the redesign, as well as promote the importance of direct stakeholder interaction throughout the design process.

5.5.2 Role of Patient Experience in Staff Experience

This study intended to shine a light on hospital staff needs, who are often overlooked during the design process but are nonetheless crucial stakeholders in healthcare environments. However, when asked to share experiences from a staff perspective, staff would often mention *patient* experiences. When asked to suggest improvements, many staff recommendations were more relevant to patient experience than their own. For example, when discussing the long length of their work shifts, one focus group participant began discussing how the patients are also "in the room for a very long time" and that it would be helpful if they could have "more distractions as far as for the patient." This finding revealed an important dynamic between staff and patients: that one's experience is very rooted in the other's. This close connection is a cornerstone of relationship-based care, which encourages establishing rapports between staff and patients to promote more positive healthcare experiences (Bush, 2010). This intertwinement further supports the notion that in the shared environment, it is important to meet both patient and staff needs, as the experiences are so closely tied with one another.

5. 6 Recommended Design Guidelines

Research question: In what ways can the new facility improve staff workplace experience through design?

Results from this study point to several opportunities for design improvements in the new facility that may better promote a positive work environment for the staff of JLGDH. Architects and planners should work to incorporate findings of this study to ensure that the new facility supports the most salient needs of staff.

5.6.1 Daylight and Window Views

Staff would benefit from a greater amount of daylight in the new facility. By incorporating more windows in the treatment area, staff and other occupants can benefit from the influx of daylight into the workspace. Additionally, windows would allow views to the outdoors, providing visual access to change in time, weather conditions, and other natural elements beyond the walls of the hospital.

Illustration 10. Conceptual Drawing of Daylight and Window Views

5.6.2 Increased Space in Infusion Area and Bays

The new facility should allow larger individual infusion bays so that there is adequate space for all patient amenities, family members and visitors of the patients, and the medical staff

who attend to the patients. More square footage within and around the infusion areas will also allow easier staff and patient flow, so that there is plentiful room to carry out various job tasks.

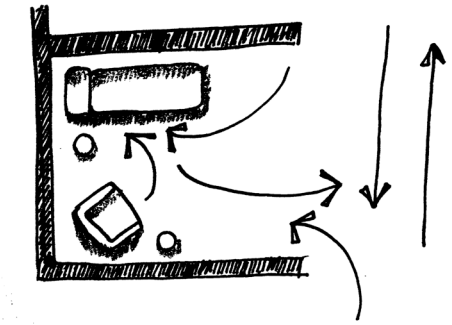


Illustration 11. Conceptual Drawing of Increased Space in Infusion Area and Bays

5.6.3 Equipment and Personal Storage

Increased storage space in the new facility will prevent the overflow of medical equipment into the infusion area workspace, where it currently interferes with job functions. Additionally, the space should afford secure lockers for staff to stow personal belongings, so that they don't need to use unoccupied patient space to do so.

Illustration 12. Conceptual Drawing of Equipment and Personal Storage

5.6.4 Staff Respite Space

Staff should be provided sufficient space to retreat from the stresses of the workplace. There should be a staff respite area adjacent to the infusion area so that staff do not have to travel far distances to take a break from their shift. The lounge should be equipped with comfortable furniture to recline and relax, as well as a refrigerator and small kitchenette to store and prepare food.

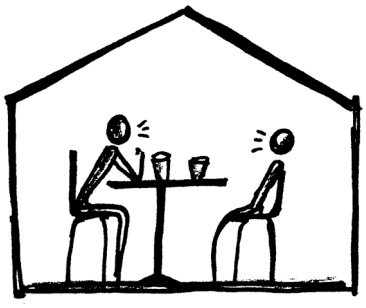


Illustration 13. Conceptual Drawing of Staff Respite Space

5.6.5 Private Meeting Space

Pediatric oncology requires staff to speak about very serious matters with one another and with families of patients. The new facility should provide private meeting areas to have these types of confidential discussions, instead of shared patient areas as they must use currently.

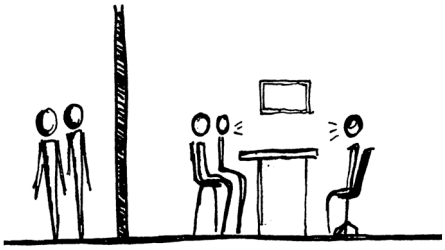


Illustration 14. Conceptual Drawing of Private Meeting Space

5.6.6 Physical Designation of Workspace

There are several types of tasks that are currently carried out in one shared area – infusion, patient schooling, consultations, and child-life activities and play. By providing adequate space in which these distinct functions can be physically separated from one another, staff will be able to more effectively carry out their responsibilities.

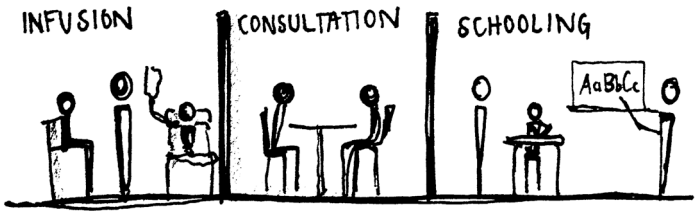


Illustration 15. Conceptual Drawing of Physical Designation of Workspace

5.6.7 Acoustic Solutions

Working in a small and condensed space filled with many individuals allows noise to travel quickly and build, creating a noise-polluted environment that becomes a workplace stressor for staff. To work towards creating a quieter environment where staff are able to focus, sound-absorbing solutions should be implemented on and in the walls and ceilings to prevent sound from traveling between and within rooms.

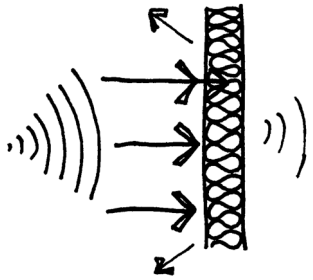


Illustration 16. Conceptual Drawing of Acoustic Solutions

CHAPTER SIX: CONCLUSION

6.1 Summary

This study is important because it identified how current staff of JLGDH perceive the existing facility and workplace in regards to physical environmental features. Results support the initial hypotheses that staff are dissatisfied with their workplace, physical design features are significantly more important to them than they are currently effective, and there are various areas for improvement in overall workplace quality to be taken into consideration as the facility undergoes relocation and redesign. This study took an important approach in considering perspectives of staff instead of patients and family in an effort to better understand how healthcare facility design influences the workplace experience.

6.2 Study Limitations

There were several limitations to this study that should be addressed. The greatest limitation was the exclusion of major stakeholders – patients and families – from the study. Due to the limited research timeline and restrictions of the Institutional Review Board at Albert Einstein College of Medicine, the principal investigator was not approved to contact patients and families of JLGDH to participate. This restriction may have prevented greater insight on how the facility is perceived from a wider range of stakeholders, and how their perceptions may overlap or differ from staff's. Because the study focused exclusively on staff perceptions, it is important to note that what is best for staff may not be best for patients. In order to create the most optimal experience for all users, all stakeholder groups should be involved in the research process.

A second limitation of this study was the small sample size for both the survey and focus groups. A greater number of participants from multiple facilities may have revealed a more

accurate description of how staff perceive their work environment. Furthermore, while participants spanned a wide variety of job positions, more representation from each position would have allowed a better understanding of how different jobs experience the facility in different ways.

Additionally, staff members who did participate may have been biased due to knowledge of the study's goals. For example, participants in the focus groups may have volunteered to participate as a platform to voice complaints, whereas staff members who may view the facility more positively did not see reason to contribute. Results may have been skewed towards only those who have negative opinions of the facility, excluding the possible favorable perceptions from findings.

6.3 Caring for Children

There are many elements of pediatric oncology that may differentiate it from other areas of medical practice; most notably that it involves caring for children exclusively. Caring for young patients brings with it unique responsibilities that may shift the context of how care is and should be provided, and furthermore how the physical setting may support this distinctive practice. For example, young patients may have more family visitors – parents, siblings, and grandparents – when they receive treatment than adults. As a result, the physical facility must provide more space for the larger quantities of visitors, especially in infusion bays. Another conjectured difference is that children are likely to have shorter attention spans than adults, and therefore need to have access to more positive distractions, such as toys, games, and media entertainment appropriate for children. Provision of more positive distractions would, for example, not only require their supply but also require additional storage space to accommodate

the supplementary materials. Pediatric care also often provides additional specialty services that adults would not require, such as schoolteachers, child-life and behavioral therapists, and social workers. These added dimensions of education and play require different functions and, as such, the facilities must be able to support them in ways that typical healthcare facilities would not.

6.4 Recommendations for Future Research

To most accurately measure the success of the redesign in improving staff perceptions of their workplace, a post-occupancy evaluation is recommended following the opening and use of the new pediatric oncology facility in CHAM's Rosenthal wing. A similar or identical survey to what participants initially received and completed should be distributed again to provide a pre/post comparison to validate if design decisions made for the new facility were effective in markedly improving perceptions of the workplace.

Moreover, similar research should be conducted at other facilities of this kind to continue improving knowledge of how the design of healthcare environments influences staff, particularly in specialized units such as pediatric oncology. In order to design and build facilities that optimize workplace performance and satisfaction, there must be ample understanding of how healthcare environment design shapes staff perceptions of their work environment.

6.5 Implications for Practice

Results of this study confirm the importance of designing high quality healthcare environments to support the needs of staff in addition to patients. It also emphasizes the importance of using research to inform architectural design practice. The results of this study will be shared with the architectural firm designing the new facility, ideally providing a

foundation on which design decisions can be based, and translating directly into design solutions for the new facility. Findings also encourage close collaboration between stakeholders, researchers, and designers, so that needs are effectively and efficiently translated into successful design solutions that optimize workplace experience.

The hospital experience is often stigmatized with being unpleasant, chaotic, and stressful for patients, visitors, and staff members alike (Ulrich et al., 2008). Hospital administration and researchers have taken notice of these negative associations, and are attempting to better understand the ways upon which the healthcare experience can be improved. While the shift towards patient-centered care has led to higher quality design and healthcare experiences for a wide range of patients, the needs of the staff that work tirelessly to provide such services must not be dismissed. Facility design holds the unique responsibility of supporting and enhancing human needs and behavior. As such, design practitioners must ensure optimal experience within these facilities by making design decisions informed by research and data.

Results of this study will not only inform the planning and design of the new pediatric oncology facility at Montefiore, but will also add to the growing body of evidence used to plan and design future facilities of its kind. Though originally intended to benefit the users of this facility in particular, this research will have impacts that extend far beyond the site of interest, ultimately benefitting future healthcare environments and their staff members. For this reason, it is of upmost importance that researchers further build understanding of how the physical environment impacts a wide variety of stakeholders, and continue improving how future healthcare experiences are both provided and perceived through translation of research into design knowledge and practice.

APPENDIX

Appendix A: Online Survey Questionnaire Script

Pediatric Hematology & Oncology at Montefiore Hospital
Measurement of Building Performance Survey

Staff Workplace Experience & Satisfaction with the Environment

1. On a typical day when in the Pediatric Hematology/Oncology clinic, how many hours is your shift?

    - < 1 hour
    - 1 – 2 hours
    - 3 – 4 hours
    - 4 - 6 hours
    - 6 - 8 hours
    - 8 - 10 hours
    - > 10 hours

2. I am satisfied with the physical environment of my workplace:

    - Strongly Disagree
    - Disagree
    - Somewhat disagree
    - Neither agree nor disagree
    - Somewhat agree
    - Agree
    - Strongly Agree

3. The physical environment makes it easy for me to communicate with coworkers on a daily basis:

    - Strongly Disagree
    - Disagree
    - Somewhat disagree
    - Neither agree nor disagree
    - Somewhat agree
    - Agree
    - Strongly Agree

4. The physical facility supports my daily job responsibilities:

- Strongly Disagree
- Disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Agree
- Strongly Agree

5. Crowding in the pediatric oncology facility prevents me from doing my job to the best of my ability:

    - Strongly Disagree
    - Disagree
    - Somewhat disagree
    - Neither agree nor disagree
    - Somewhat agree
    - Agree
    - Strongly Agree

6. Working in the pediatric oncology facility often makes me feel stressed:

    - Strongly Disagree
    - Disagree
    - Somewhat disagree
    - Neither agree nor disagree
    - Somewhat agree
    - Agree
    - Strongly Agree

7. Working in the pediatric oncology facility often makes me feel tired:

    - Strongly Disagree
    - Disagree
    - Somewhat disagree
    - Neither agree nor disagree
    - Somewhat agree
    - Agree
    - Strongly Agree

Environmental Features

8. How **important** are the following physical environment features in a pediatric oncology facility in their contribution to a positive working environment? By important, we mean how critical these features are to the support of staff.

	Not at all important	Very unimportant	Somewhat unimportant	Neither important nor unimportant	Somewhat important	Very important	Critically important
Comfortable furniture							
Attractive furniture							
Damage-resistant furniture							
Good electrical lighting							
Good natural day lighting							
Visual Positive distractions (e.g. artwork, photography)							
Break/lounge spaces for staff respite							
Window Views							
Hotel-like atmosphere							
Quiet environment							
Good task lighting							
Work areas where I can concentrate							

9. How **effective** are the following physical environment features in your current facility? By effective, we mean how well your current facility incorporates these features in the physical environment.

	Not at all effective	Very ineffective	Somewhat ineffective	Neither effective nor ineffective	Somewhat effective	Very effective	Completely effective
Comfortable furniture							
Attractive furniture							
Damage-resistant furniture							
Good electrical lighting							
Good natural day lighting							
Visual Positive distractions (e.g. artwork, photography)							
Break/lounge spaces for staff respite							
Window Views							
Hotel-like atmosphere							
Quiet environment							
Good task lighting							
Work areas where I can concentrate							

10. Please rank the following design features in order of their importance to you in a work environment (1 = most important, 12 = least important). You may rank by clicking and dragging each of the features to their respective position.

    - Comfortable Furniture
    - Attractive Furniture
    - Damage-Resistant Furniture
    - Good Electrical Lighting
    - Good Natural Day Lighting
    - Visual Positive Distractions (e.g. artwork, photography)
    - Break/Lounge Spaces for Staff Respite
    - Window Views
    - Hotel-like Atmosphere
    - Quiet Environment
    - Good Task Lighting
    - Work Areas where I can Concentrate

11. Please provide additional comments that might be useful in the remodeling/redesign of a pediatric oncology facility:

Respondent Demographics:

12. What is your current job title at Montefiore Hospital?
    - Child Life Specialist
    - Nurse
    - Nurse Practitioner
    - Nurse Technician
    - Physician
    - Receptionist/Administrative Assistant
    - Social Worker
    - Other (please specify) _____

13. What is your gender?

- Male
- Female

14. Please enter your age: _____

Appendix B: Survey Results Statistical Tables

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	COMF FURN IMP.	5.64	33	.699	.122
	COMF FURN EFF	3.88	33	1.635	.285
Pair 2	ATTR. FURN IMP	4.21	33	1.244	.217
	ATTR. FURN EFF	3.03	33	1.591	.277
Pair 3	DAM RES. FURN IMP	5.64	33	1.025	.178
	DAM RES. EFF	3.76	33	1.786	.311
Pair 4	ELECTR. IMP	6.09	33	.723	.126
	ELECTR. EFF	4.58	33	1.582	.275
Pair 5	DAYLIGHT IMP	5.97	33	.951	.166
	DAYLIGHT EFF	2.45	33	2.123	.370
Pair 6	POS. DIST. IMP	5.15	33	1.064	.185
	POS. DIST. EFF	3.52	33	1.873	.326
Pair 7	STAFF LNGE IMP	5.58	33	1.001	.174
	STAFF LNGE EFF	2.39	33	2.150	.374
Pair 8	WINDOW IMP	5.64	33	.994	.173
	WINDOW EFF	2.55	33	2.181	.380
Pair 9	HOTEL-LIKE IMP	3.39	33	1.368	.238
	HOTEL-LIKE EFF	2.21	33	1.596	.278
Pair 10	QUIET IMP	5.21	33	.820	.143
	QUIET EFF	2.64	33	2.013	.350
Pair 11	TASK LIGHT IMP	6.03	33	.728	.127
	TASK LIGHT EFF	4.09	33	1.942	.338
Pair 12	CONCEN. AR. IMP	6.30	33	.951	.166
	CONCEN. AR. EFF	2.88	33	2.043	.356

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	COMF FURN IMP. & COMF FURN EFF	33	.179	.319
Pair 2	ATTR. FURN IMP & ATTR. FURN EFF	33	.439	.011
Pair 3	DAM RES. FURN IMP & DAM RES. EFF	33	.070	.699
Pair 4	ELECTR. IMP & ELECTR. EFF	33	.226	.206
Pair 5	DAYLIGHT IMP & DAYLIGHT EFF	33	.255	.153
Pair 6	POS. DIST. IMP & POS. DIST. EFF	33	.210	.240
Pair 7	STAFF LNGE IMP & STAFF LNGE EFF	33	.182	.311
Pair 8	WINDOW IMP & WINDOW EFF	33	.210	.242
Pair 9	HOTEL-LIKE IMP & HOTEL-LIKE EFF	33	.318	.071
Pair 10	QUIET IMP & QUIET EFF	33	.200	.265
Pair 11	TASK LIGHT IMP & TASK LIGHT EFF	33	.197	.272
Pair 12	CONCEN. AR. IMP & CONCEN. AR. EFF	33	-.125	.487

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	COMF FURN IMP. - COMF FURN EFF	1.758	1.659	.289	1.169	2.346	6.086	32	.000
Pair 2	ATTR. FURN IMP - ATTR. FURN EFF	1.182	1.530	.266	.639	1.724	4.437	32	.000
Pair 3	DAM RES. FURN IMP - DAM RES. EFF	1.879	1.996	.347	1.171	2.587	5.407	32	.000
Pair 4	ELECTR. IMP - ELECTR. EFF	1.515	1.584	.276	.954	2.077	5.496	32	.000
Pair 5	DAYLIGHT IMP - DAYLIGHT EFF	3.515	2.093	.364	2.773	4.257	9.646	32	.000
Pair 6	POS. DIST. IMP - POS. DIST. EFF	1.636	1.950	.339	.945	2.328	4.821	32	.000
Pair 7	STAFF LNGE IMP - STAFF LNGE EFF	3.182	2.200	.383	2.402	3.962	8.307	32	.000
Pair 8	WINDOW IMP - WINDOW EFF	3.091	2.199	.383	2.311	3.871	8.075	32	.000
Pair 9	HOTEL-LIKE IMP - HOTEL-LIKE EFF	1.182	1.740	.303	.565	1.799	3.901	32	.000
Pair 10	QUIET IMP - QUIET EFF	2.576	2.016	.351	1.861	3.291	7.339	32	.000
Pair 11	TASK LIGHT IMP - TASK LIGHT EFF	1.939	1.936	.337	1.253	2.626	5.756	32	.000
Pair 12	CONCEN. AR. IMP - CONCEN. AR. EFF	3.424	2.359	.411	2.588	4.261	8.339	32	.000

Correlations

		SATISIFACTION	COMMUNICATION	SUPPORT JOB RESP.	CROWDING PREVENTS	STRESS	TIRED
SATISIFACTION	Pearson Correlation	1	.634**	.705**	-.303	-.429*	-.345*
	Sig. (2-tailed)		.000	.000	.077	.010	.042
	N	35	35	34	35	35	35
COMMUNICATION	Pearson Correlation	.634**	1	.600**	-.102	-.312	-.367*
	Sig. (2-tailed)	.000		.000	.559	.069	.030
	N	35	35	34	35	35	35
SUPPORT JOB RESP.	Pearson Correlation	.705**	.600**	1	-.417*	-.224	-.439**
	Sig. (2-tailed)	.000	.000		.014	.202	.009
	N	34	34	34	34	34	34
CROWDING PREVENTS	Pearson Correlation	-.303	-.102	-.417*	1	.180	.401*
	Sig. (2-tailed)	.077	.559	.014		.300	.017
	N	35	35	34	35	35	35
STRESS	Pearson Correlation	-.429*	-.312	-.224	.180	1	.597**
	Sig. (2-tailed)	.010	.069	.202	.300		.000
	N	35	35	34	35	35	35
TIRED	Pearson Correlation	-.345*	-.367*	-.439**	.401*	.597**	1
	Sig. (2-tailed)	.042	.030	.009	.017	.000	
	N	35	35	34	35	35	35

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Appendix C: Expanded List of Survey Comments and Themes

Theme	Comment
Lack of Space, Overcrowding	*"The doctor's room is small and overcrowded and I often spend the entire time standing and not having access to a computer. It needs to be at least double in size."* ***"**There needs to be more space for our patients, at this point we have staff to see the patients we need but not actual rooms to do so. Patients have had to wait for a bed to receive their chemotherapy as the clinic space was full and that is unacceptable."*
Windows & Lighting	*"...there are NO windows and that is important for patients that spend the entire day there."*
Break/Lounge/ Relaxation Space	*"... the RNS that work so hard have no place to eat their lunch and take a minute to themselves."* ***"**It is a critical environment I strongly believe we all can use some relaxation/meditation room/environment"*
Storage	*"A small cabinet where student and curriculum materials could be stored would also be favorable and more time efficient, as teachers are often going to other floors to pick up materials."* *"decent size storage space for medical equipment such as wheelchairs, portable O2 tanks…do not belong in clean utility room."*
Furnishing	*"Furniture should be of a fabric that can be wiped down daily, not made of cloth that and be stained by food, vomit, urine or stool."*
IT Support	*"In addition, teachers and patients would benefit from consistent wifi. This would improve our access to student materials and online courses for high school students."* *"A room with enough computers so that everyone can work."*

Adequate/ Designated Meeting and Work Spaces	*"a work area for the hospital teachers to meet with the patients would be helpful. As would a separate room/space where social worker can talk privately with the parent or patient (without interrupting the flow/use of the exam rooms)."* *"We need designated clinic rooms for each subspecialty. (ie. a room for sickle cell, a room for brain tumors, etc.)"* *"We also need a parent/doctor conference room to use for long discussions, so as not to an exam room."*

Appendix D: Focus Group Script

- *Please describe typical work activities and tasks that occur in the infusion bays*
- *Please describe what a typical day looks like for you here at CHAM*
- *How often do you speak with families, and what are those interactions typically like?*
- *How often do you get/take breaks? What do you do during your breaks? Where do you go during your breaks? Please describe any and all activities (break rooms, etc.)*
- *What types of spaces would best support your wellbeing during breaks?*
- *What are things that make you most stressed while at work? How do you typically cope with stress while at work?*
- *Do you feel like your work community provides social support for you? Explain*
- *What are things you'd like to see in the new space that currently don't exist?*
- *How could the new space better support staff experience and outcomes?*

Appendix E: Expanded Table of Focus Group Themes and Quotations

Theme	**Finding / Takeaway**	**Focus Group Quotation**
Zoning and Designation of Work Space	There is not enough designated space for the range of tasks and job responsibilities and, as a result, staff struggle to balance all of them in the shared space.	*"[Transplant patients] also need to be isolated. So there's really no isolation in the waiting area. We definitely have to put them in the room right away. And when they book 'em... We only have one room that's like designated for the bone marrow transplant, which is room three, but sometimes they don't just make one appointment for one patient. We have four bone marrow transplants and now we're trying to figure out what room."*
Crowding	Limited physical space in the unit, coupled with high volumes of people – staff, patients, family members – interrupts the course of staff's work activities and provision of a high quality patient experience	*"When our clinic infusion area is full, and there's families with multiple family members with them, when it really gets in our way, if we have a very sick kid... We will ask families to go back out to the waiting area, we'll say, 'One person come in and you can alternate coming back and forth'"*
Lounge/Break/ Respite Space	There is a lack of adjacent support space for staff to take a break from their work shift, relax, and eat	*"Well, there's no place to go right now… I don't remember when I took a break last."* *"I go downstairs to go on my break, or to relax, I just hear screaming. It's like I don't want that. I want to relax just for an hour on my break. You know?"*
Storage Space	The current facility lacks adequate space for staff to store necessary medical equipment and supplies, as well as personal belongings. As a result, staff must infringe on usable patient space to make room for these items.	*"There's no place to store the chemo. It's in a cooler on a cart."* *"We don't have no where to put our bags or coats... We hide things."* *"We keep [our things] in the*

		cubbies in [Bay 11]…We're using patient space, yes."
Technology	There is a lack of high-performing, reliable technology in the current facility, which interferes with various job tasks throughout a given work day.	*"Right now we're running to the secretaries for them to print something, to copy something, a lot of wasted [time]...It'd be great if we could have our own printer/copier/fax machine in the area to save us from running out, waiting to see if the fax went through..."*
Furnishing	Cleanable, maintainable furniture is needed to support hygiene in the infusion area and	*"But, we need furniture that can be cleaned, because they were so nasty with stains on 'em. And just for, like shingles and varicella and C. Diff, and the flu. You can't wipe anything down, it needs to be a vinyl..."*
Staff Privacy	The current space does not afford its users with privacy when it comes to conversation or control of interaction, which makes staff uncomfortable during serious and difficult work responsibilities	*"The conference room, whatever you're going to call it, not only are they doing new diagnosis talking, but you have doctors doing end-of-life talks, in the inclusion area... Right next to other patients."*
Compromised Workflow	The existing space does not allow for effective and efficient flow of work activities and staff movement throughout the space	*"… At one point, I did have a bigger bed, but it was in the way of everything. It was hard. If you have all your supplies, somebody's gonna trip over it because it's just in the way, and that's not fair to the people that are trying to get to this patient"*
Compromised Patient Flow	Poor adjacencies and layout of patient spaces require patients to travel far distances, making it difficult for staff to keep track of their whereabouts and direct them to the next	*"Our patients... get off the elevator and they check-in, then they typically get back on the elevator and go upstairs to the fourth floor to have their blood drawn. Then they come back down to the third floor and they wait in our teeny-tiny waiting area where they're all on top of each other. Then they go get their vital signs taken, or*

		height and weight. Then they go back out to the waiting room, where again, it's too crowded and they wait too long. And then a nurse practitioner typically will call them into an exam room, get a history, do a physical examination, and then they'll wait in the exam room for a little while for a physician to come see them as well. Then they go back out to the waiting room, and then they go into the infusion area to get treatment….So it's a lot of...back and forth."
Maintenance, Safety, & Hygiene	The small and crowded infusion space does not provide occupants enough designated areas for or physical separation from patients with highly contagious medical conditions, infringing on patient, visitor, and staff hygiene and health	*"…in the infusion unit it's a single-stall bathroom…Kids that have C. Diff, which is a diarrhea that's contagious, they're using that bathroom. We don't have enough housekeeping to clean the bathroom, so a lot of times the nurses are going in there and wiping down the toilet with bleach wipes and disinfectant wipes, and so on and so forth. So, multiple bathrooms would be good, and one that we could designate at the time when we need to, for someone that has C. Diff to use that bathroom would be optimal. I don't want to get C. Diff"*
Ambient Conditions: Noise, Lighting, Air Quality	With such a small and windowless facility, there is abundance of noise, insufficient natural or task lighting, and poor air circulation	*"Having some sort of sound absorption, something, would be amazing, for each of those individual rooms, because the babies crying can be traumatizing for the other families and the other kids"* *"… we've been working in a clinic with no windows for about 10 years, and...[we need] light, natural light. And also artificial*

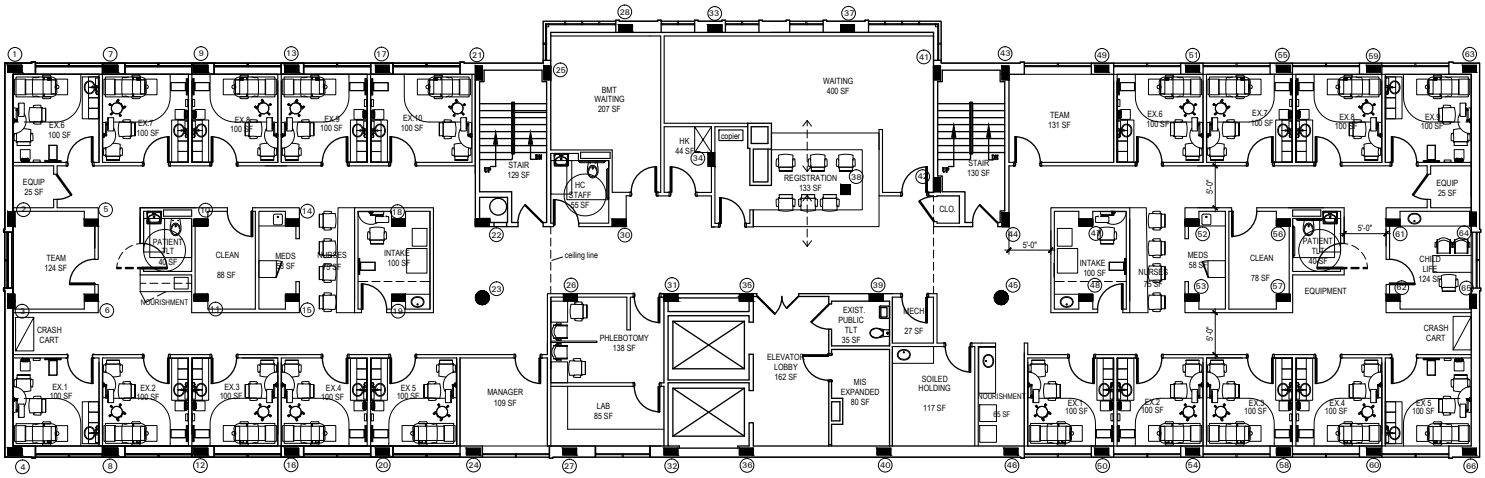
		light for starting IVs, placing NG tubes, placing urinary catheters"
Sense of Community	Staff do not enjoy working in the physical space, but enjoy working in the company of their coworkers	*"I think outside of the people that work in this area and work together, there's nothing about that physical space that is worth keeping"*
Improvisation	Staff make do with the resources available, even though they may not be appropriate for a certain job task	*"Well we use the storage room as a office, if we need to have a private conversation."* *"I'm a garbage can sitter. People sit on garbage cans or in chairs, the kids' chairs, the little ones."*

Appendix F: Expanded Table of Interview Themes and Quotations

Theme	**Finding / Takeaway**	**Interview Quotation**
Staff Support Space	Requirements for staff space are not as developed as they are for patient space — as a result, staff support space often becomes an afterthought in the planning process	*"The staff support space, basically there's a team room, there's secondaries, or nurse stations where each of the nurse stations are per the zones… the issue with trying to program something like this is they're putting too much eggs in one basket… by doing that you just take away all the space, and whatever's left is sort… Goes to staff."* *"In the FGI (Facility Guidelines Institute) there are minimum requirements too, for staff, but it's not as pronounced as what's required for patients."*
User/Stakeholder Interaction		*"..there's always this holdup of feedback and we're never speaking directly to the hospital staff or the doctors you know, what could maybe be a more efficient communication process"*
Design Program Challenges		*"I think the biggest design goal was to kind of fit the design program in what is a pretty small space and difficult building. And to work with the existing infrastructure…"*
Design Goals	The major design goals expressed by the architects were to increase amount of storage and workspace; this echoed many of the staff's concerns and current issues with the existing space	*"More working stations, more storage… those are the two biggest [design goals]. More space to put things, they design these spaces and then like treatment practice is filled with tons of equipment and blood pressure cups and everything that's needed for treatment and there's never enough room to put things"*

Appendix G: Floor Plans of New Facility (as of April 2017)

Plans courtesy of Perkins Eastman

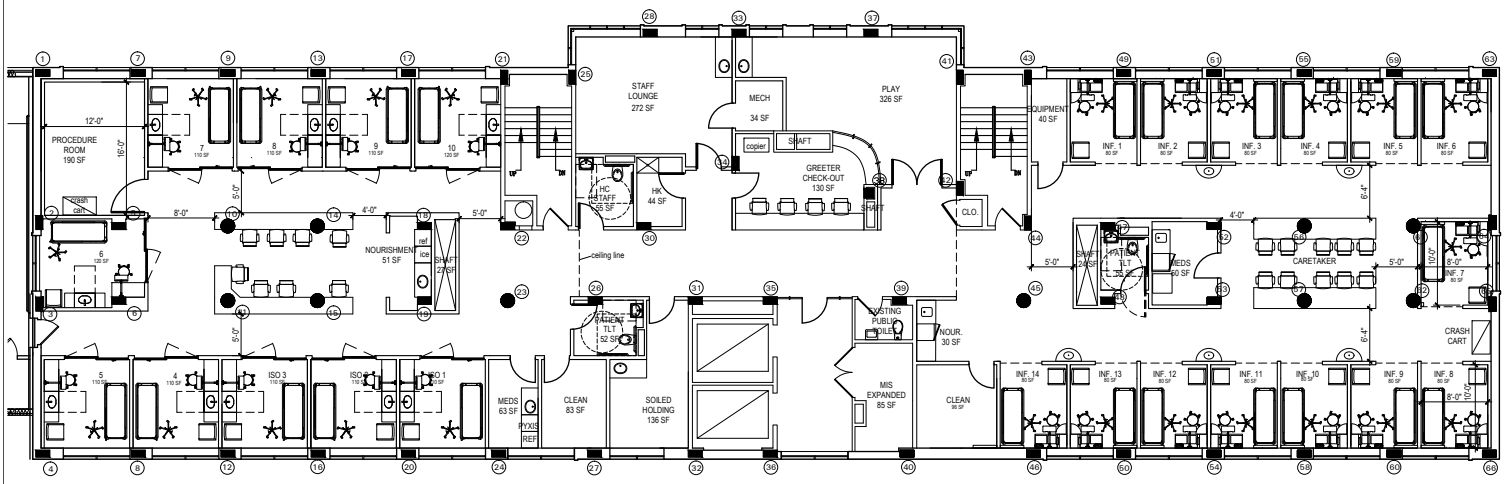


Montefiore
THE UNIVERSITY HOSPITAL FOR ALBERT EINSTEIN COLLEGE OF MEDICINE

Pediatric Infusion Suite & Ambulatory Specialties Project
RSE - THIRD FLOOR - ALTERNATE 1

Perkins Eastman
REVISED: AUGUST 3, 2016
REVISED: JULY 26, 2016
JULY 19, 2016

PROJECT#: 66900.00
SCALE: 1/8" = 1'-0"



Montefiore
THE UNIVERSITY HOSPITAL FOR ALBERT EINSTEIN COLLEGE OF MEDICINE

Pediatric Infusion Suite & Ambulatory Specialties Project
RSE - FOURTH FLOOR - ALTERNATE 2

Perkins Eastman
REVISED: AUGUST 3, 2016
REVISED: JULY 27, 2016
JULY 19, 2016

PROJECT#: 66900.00
SCALE: 1/8" = 1'-0"

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GLOSSARY

ATLAS.ti	Computer program popularly used in research to quantify and analyze large bodies of qualitative data (e.g., interview/focus group transcriptions)
Code	A singular term assigned to an instance or theme that emerges in qualitative data analysis
Hematology	Branch of medicine concerned with the study of the physiology of blood
Infusion Bay	Unit of space designated to a patient (usually private or semi-private) while they receive infusion treatment
Oncology	Branch of medicine concerned with the study and treatment of tumors